

SAFETY.CAT.COM™

MAINTENANCE INTERVALS

Operation and Maintenance
Manual Excerpt



Operation and Maintenance Manual

966H and 972H Wheel Loaders

GTA1-Up (972H)
LCC1-Up (972H)
A6D1-Up (966H)
A7D1-Up (972H)
RYF1-Up (966H)
A6G1-Up (966H)
A7G1-Up (972H)
A6J1-Up (966H)
A7J1-Up (972H)
TAL1-Up (966H)

i05121809

Maintenance Interval Schedule

SMCS Code: 7000

S/N: GTA1-Up

S/N: LCC1-Up

S/N: A6D1-Up

S/N: A7D1-Up

S/N: A6G1-Up

S/N: A7G1-Up

S/N: A6J1-Up

S/N: A7J1-Up

S/N: TAL1-Up

Ensure that all safety information, warnings, and instructions are read and understood before any operation or any maintenance procedures are performed.

The user is responsible for the performance of maintenance. All adjustments, the use of proper lubricants, fluids, filters, and the replacement of components due to normal wear and aging are included. Failure to adhere to proper maintenance intervals and procedures may result in diminished performance of the product and/or accelerated wear of components.

Use mileage, fuel consumption, service hours, or calendar time, WHICH EVER OCCURS FIRST, in order to determine the maintenance intervals. Products that operate in severe operating conditions may require more frequent maintenance. Refer to the maintenance procedure for any other exceptions that may change the maintenance intervals.

Note: The aftertreatment system can be expected to function properly for the useful life of the engine (emissions durability period), as defined by regulation. All prescribed maintenance requirements must be followed.

Note: Before each consecutive interval is performed, all maintenance from the previous interval must be performed.

Note: If Cat HYDO Advanced hydraulic oils are used, the hydraulic oil change interval is extended substantially. S-O-S services may extend the oil change even longer. Consult your Cat dealer for details.

The following guidelines should be followed if the service hours are not met:

Items listed between 10 and 100 service hours should be performed at least every 3 months.

Items listed between 250 and 500 service hours should be performed at least every 6 months.

Items listed between 1000 service hours and 2500 service hours should be performed at least every year.

When Required

Automatic Lubrication Grease Tank - Fill	142
Battery or Battery Cable - Inspect/Replace	144
Bucket Cutting Edges - Inspect/Replace	147
Bucket Hinge and Lift Arm Clearance Shims - Inspect/Adjust/Replace	148
Bucket Tips - Inspect/Replace	150
Camera - Clean	153
Circuit Breakers - Reset	153
Engine Air Filter Primary Element - Clean/Replace	163
Engine Air Filter Secondary Element - Replace ..	165
Ether Starting Aid Cylinder - Replace	171
Fuel System - Prime	171
Fuses - Replace	176
High Intensity Discharge Lamp (HID) - Replace ..	177
Oil Filter - Inspect	184
Pallet Fork - Inspect	185
Radiator Core - Clean	189
Ride Control Accumulator - Check	190
Secondary Steering - Test	192
Window Washer Reservoir - Fill	201
Window Wiper - Inspect/Replace	201

Every 10 Service Hours or Daily

Backup Alarm - Test	143
Cooling System Coolant Level - Check	157
Engine Oil Level - Check	167
Fuel System Primary Filter (Water Separator) - Drain	172
Hydraulic System Oil Level - Check	183
Quick Coupler - Check	189
Seat Belt - Inspect	191
Transmission Oil Level - Check	200
Windows - Clean	202

Every 50 Service Hours or Weekly

Bucket Lower Pivot Bearings - Lubricate	150
Cab Air Filter - Clean/Replace	152
Fuel Tank Water and Sediment - Drain	175
Tire Inflation - Check	198

Every 100 Service Hours or 2 Weeks

Axle Oscillation Bearings - Lubricate	143
Bucket Linkage and Loader Cylinder Bearings - Lubricate	149
Bucket Upper Pivot Bearings - Lubricate	152
Logging Fork Clamp - Lubricate	184

Steering Cylinder Bearings - Lubricate 195

Initial 250 Service Hours

Electronic Unit Injector - Inspect/Adjust 163
Engine Oil Sample - Obtain 167
Engine Valve Lash - Check 170
Engine Valve Rotators - Inspect 170
Transmission Oil Filter - Replace 199

Every 250 Service Hours

Drive Shaft Support Bearing - Lubricate 162

Every 250 Service Hours or Monthly

Battery - Clean 144
Belt - Inspect/Adjust/Replace 145
Brake Accumulator - Check 146
Braking System - Test 146
Cooling System Coolant Sample (Level 1) -
Obtain 157
Differential and Final Drive Oil Level - Check 160
Drive Shaft Spline (Center) - Lubricate 161
Engine Crankcase Breather - Clean 166
Engine Oil Sample - Obtain 167
Quick Coupler - Lubricate 189

Every 250 Service Hours or 3 Months

Engine Oil and Filter - Change 168
Pallet Fork - Lubricate 188
Steering Column Play - Check 193

Initial 500 Hours (for New Systems, Refilled Systems, and Converted Systems)

Cooling System Coolant Sample (Level 2) -
Obtain 158

Every 500 Service Hours

Transmission Oil Filter - Replace 199

Every 500 Service Hours or 3 Months

Differential and Final Drive Oil Sample - Obtain .. 161
Engine Oil and Filter - Change 168
Fuel System Primary Filter (Water Separator)
Element - Replace 173
Fuel System Secondary Filter - Replace 174
Fuel Tank Cap and Strainer - Clean 175
Hydraulic System Biodegradable Oil Filter Element -
Replace 178
Hydraulic System Oil Filter - Replace 182
Hydraulic System Oil Sample - Obtain 183
Transmission Oil Sample - Obtain 201

Every 1000 Service Hours

Drive Shaft Universal Joints - Lubricate 163

Every 1000 Service Hours or 6 Months

Articulation Bearings - Lubricate 142
Battery Hold-Down - Tighten 144
Roading Fender Hinges - Lubricate 190
Rollover Protective Structure (ROPS) - Inspect .. 191
Steering Pilot Oil Screen (Command Control
Steering) - Clean/Replace 196
Transmission Oil - Change 198

Every 2000 Service Hours or 1 Year

Brake Discs - Check 146
Differential and Final Drive Oil - Change 159
Electronic Unit Injector - Inspect/Adjust 163
Engine Valve Lash - Check 170
Engine Valve Rotators - Inspect 170
Hood Tilt Actuator - Lubricate 178
Hydraulic System Oil - Change 179
Hydraulic Tank Breaker Relief Valve - Clean 184
Service Brake Wear Indicator - Check 193
Steering Column Spline (Command Control Steering)
- Lubricate 193

Every Year

Cooling System Coolant Sample (Level 2) -
Obtain 158
Receiver Dryer (Refrigerant) - Replace 190

Every 3000 Service Hours

Steering Column Spline (HMU Steering) -
Lubricate 194

Every 3 Years

Seat Belt - Replace 192

Every 6000 Service Hours or 3 Years

Cooling System Coolant Extender (ELC) - Add .. 155
Cooling System Water Temperature Regulator -
Replace 158

Every 12 000 Service Hours or 6 Years

Cooling System Coolant (ELC) - Change 154

i02613559

i04155776

Articulation Bearings - Lubricate

SMCS Code: 7057-086-BD; 7065-086-BD;
7066-086-BD

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

Wipe all fittings before applying grease.

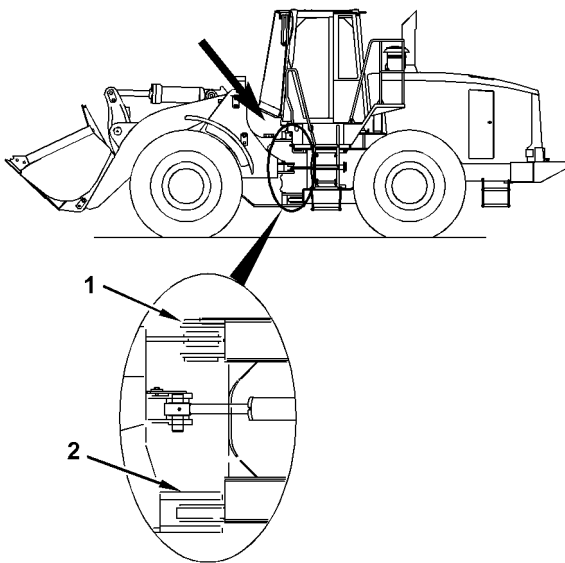


Illustration 154

g01236829

Apply grease to one fitting on the upper pivot bearing (1) and one fitting on the lower pivot bearing (2).

Automatic Lubrication Grease Tank - Fill (Autolube - If Equipped)

SMCS Code: 7540-544-TNK

The Automatic TWIN Greasing System

Reference: Refer to System Operation, RENR 6331 for more information on the Automatic TWIN Greasing System.

WARNING

A pressure hazard is present. Severe personal injury or death can result from removing hoses or fittings that are under pressure. Relieve the pressure in the system before you remove hoses or fittings.

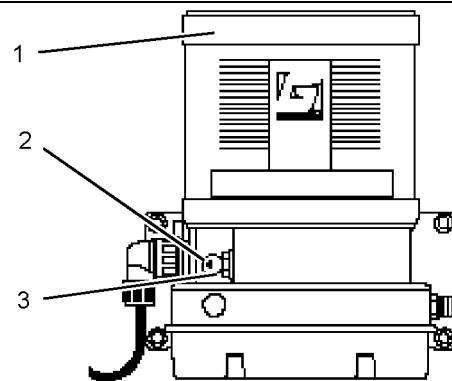


Illustration 155

g01068678

- (1) Reservoir
- (2) Dust Cap
- (3) Fill Location

Grease reservoir (1) is located near the rear fender on the right side of the machine.

Filling the Reservoir

1. Remove the dust cap (2) from the grease reservoir (1).
2. Clean the filler tube assembly (3) and the coupling on the filler assembly. Clean the filter located behind the coupling. Refer to Operation and Maintenance Manual, "Automatic Lubrication Filler Filter - Clean".
3. Install the filler assembly onto the filler tube assembly (3).

4. Fill the grease reservoir (1) with grease to the maximum level which is indicated on the grease reservoir (1).

Reference: For the correct type of grease, refer to Operation and Maintenance Manual, "Lubricant Viscosities".

Note: If a different brand of grease is used, check for combustability. If the new grease is not combustable with the grease in the reservoir, the system must be purged. Refer to System Operation, RENR 6331 for more information about purging the system.

5. Remove the filler assembly and install the dust cap (2).

i03657089

Axle Oscillation Bearings - Lubricate

SMCS Code: 3268-086-BD; 3278-086-BD

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

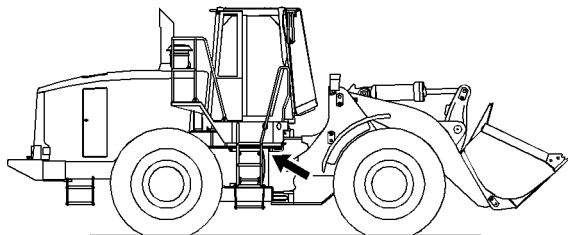


Illustration 156

g01103093

Open the access panel on the right side of the machine in front of the steps.

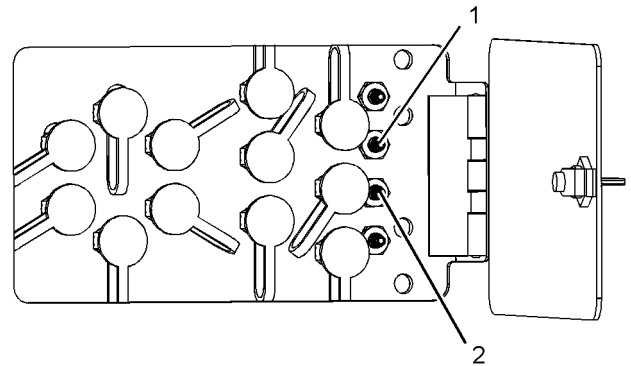


Illustration 157

g01105565

Wipe all fittings before lubricating.

Grease fitting (1) will lubricate the axle pivot bearing that is on the front of the rear axle. Grease fitting (2) will lubricate the axle pivot bearing that is on the rear of the rear axle.

Note: 5P-0960 Molybdenum Grease is preferred. 1P-0808 Multipurpose Grease may be used.

i04404608

Backup Alarm - Test (If Equipped)

SMCS Code: 7406-081

The backup alarm is on the rear of the machine.

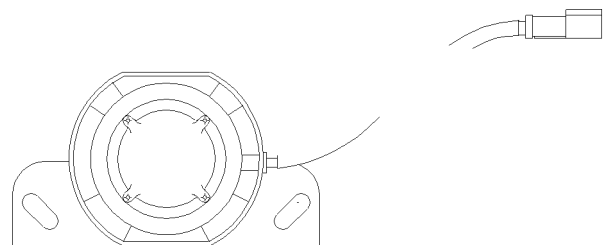


Illustration 158

g01043892

Turn the engine start switch to the ON position in order to perform the test.

Apply the service brake. Place the transmission into REVERSE.

The backup alarm should sound immediately. The backup alarm will continue to sound until the transmission is placed into NEUTRAL or into FORWARD.

i02170472

Battery - Clean

SMCS Code: 1401-070

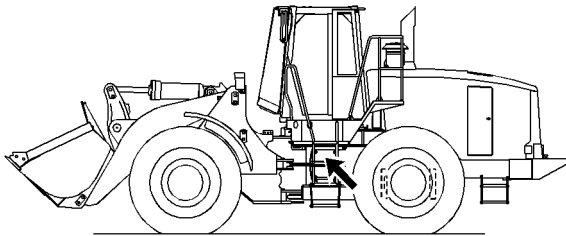


Illustration 159

g01100143

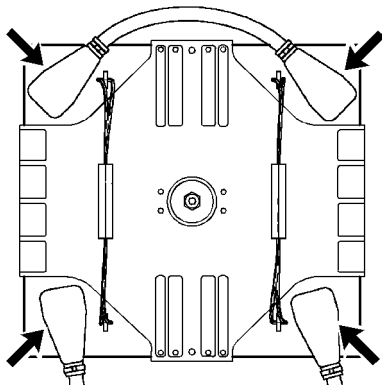


Illustration 160

g01100147

Open the battery compartment on the left side of the machine under the platform. Remove the battery hold-down.

Clean the battery terminals and the surfaces of the batteries with a clean cloth. Coat the battery terminals with petroleum jelly. Make sure that the battery cables are installed securely.

Replace the battery hold-down. Refer to Operation and Maintenance Manual, "Battery Hold-Down - Tighten" for the correct torque. Close the battery compartment.

i02185798

Battery Hold-Down - Tighten

SMCS Code: 7257-527

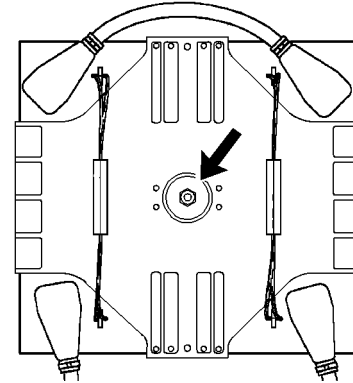


Illustration 161

g00882014

Open the battery compartment on the left side of the machine under the platform.

Over time, the vibration of an operating machine can cause the battery hold-down to loosen. To help to prevent loose batteries and the possibility of loose cable connections, tighten the locknut in the center of the hold-down to a torque of $14 \pm 3 \text{ N}\cdot\text{m}$ ($10 \pm 2 \text{ lb ft}$).

i03657099

Battery or Battery Cable - Inspect/Replace

SMCS Code: 1401-040; 1401-510; 1402-040; 1402-510

WARNING

Personal injury may occur from failure to properly service the batteries.

Batteries give off flammable fumes that can explode. Electrolyte is an acid and can cause personal injury if it contacts the skin or eyes.

Prevent sparks near the batteries. Sparks could cause vapors to explode. Do not allow jumper cable ends to contact each other or the engine. Improper jumper cable connections can cause an explosion.

Always wear protective glasses when working with batteries.

1. Turn the engine start switch key OFF. Turn all of the switches OFF.

2. Turn the battery disconnect switch OFF. Remove the key.
 3. Disconnect the negative battery cable from the disconnect switch.
- Note:** Do not allow the disconnected battery cable to contact the disconnect switch.
4. Disconnect the negative battery cable at the battery.
 5. Disconnect the positive battery cable at the battery.
 6. Inspect the battery terminals for corrosion. Inspect the battery cables for wear or damage.
 7. Make any necessary repairs. If necessary, replace the battery cables or the battery.
 8. Connect the positive battery cable at the battery.
 9. Connect the negative battery cable at the battery.
 10. Connect the battery cable at the battery disconnect switch.
 11. Install the key and turn the battery disconnect switch ON.

Recycle the Battery

Always recycle a battery. Never discard a battery.

Always return used batteries to one of the following locations:

- A battery supplier
- An authorized battery collection facility
- Recycling facility

i03657235

Belt - Inspect/Adjust/Replace

SMCS Code: 1397-025; 1397-040; 1397-510

Your machine is equipped with a single serpentine belt. Stop the engine. Open the rear hood. The belt is located on the front of the engine.

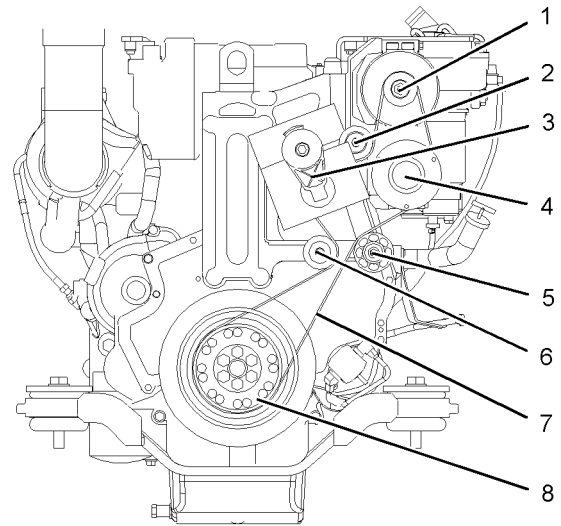


Illustration 162

g01100124

- (1) Alternator
- (2) Idler
- (3) Tensioner
- (4) Compressor
- (5) Idler
- (6) Idler
- (7) Serpentine Belt
- (8) Crankshaft Pulley

Tensioner (3) keeps the correct tension on belt (7). Insert a ratchet with a square drive into tensioner (3). Rotate the tensioner counterclockwise in order to relieve tension on the belt. Remove the belt.

Install the new belt. Be sure that the new belt is routed correctly, as shown. Rotate the tensioner counterclockwise in order to install the new belt. Release the tensioner when the new belt is installed. The correct tension will automatically be applied.

i05092713

i01732078

Brake Accumulator - Check

SMCS Code: 4263-535

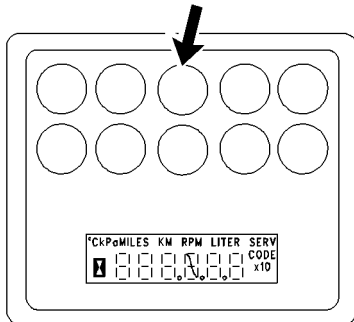


Illustration 163

g00882020

1. Turn the engine start switch to the ON position. The alert indicator for brake oil pressure should come on if the braking system is not at normal operating pressure.
2. Start the engine. Run the engine at half speed for 2 minutes in order to increase the accumulator pressure. The alert indicator for brake oil pressure should go off.
3. Stop the engine by turning the machine start switch to off. Wait 5 seconds then turn machine start switch to on, but do not start the engine. Wait for the display monitor to go through startup, key on level checks, and operator selection. Apply the service brakes (fully depress the pedal) for a duration of one second. Release the pedal for a duration of one second. Repeat the application and release process until the alert indicator for brake oil pressure comes on. This will decrease the accumulator pressure. A minimum of five applications of the service brake pedal are required.
4. If the alert indicator comes on after less than five applications of the brake, measure the accumulator precharge pressure. An authorized Caterpillar dealer can measure the nitrogen gas pressure in the accumulator. Use only dry nitrogen gas for recharging.

Brake Discs - Check

SMCS Code: 4255-535

Reference: For the correct procedure, refer to the Testing and Adjusting Service Manual of the braking system for your machine or consult your Caterpillar dealer.

i01739721

Braking System - Test

SMCS Code: 4251-081; 4267-081

- Fasten the seat belt before you test the brakes.
- Park the machine on a dry, level surface.
- Check the area around the machine. Make sure that the machine is clear of personnel and clear of obstacles.
- Make sure that the steering frame lock is in the unlocked position.

The following tests are used to determine whether the braking system is functional. These tests are not intended to measure the maximum brake holding effort. The required brake holding effort for sustaining a machine at a specific engine rpm varies from one machine to another machine. The variations include differences in the engine setting, the power train efficiency, the brake holding ability, etc.

Service Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move during test, reduce the engine speed immediately and engage the parking brake.

1. Start the engine. Raise the implement slightly. Apply the service brake. Release the parking brake.
2. Move the transmission control to THIRD SPEED FORWARD while the service brakes are applied. Make sure that the autoshift control is in the OFF position.
3. Gradually increase the engine speed to high idle. The machine should not move.

i03657238

4. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Engage the parking brake. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Parking Brake Holding Ability Test

WARNING

Personal injury can result if the machine moves while testing.

If the machine begins to move, reduce the engine speed immediately and apply the service brake pedal.

This test is performed when the parking brake is engaged. If the machine begins to move, compare the engine rpm to the engine rpm of a prior test. This will indicate the amount of system deterioration.

1. Start the engine. Raise the implement slightly. Engage the parking brake.
2. Move the transmission control to THIRD SPEED FORWARD. Make sure that the autoshift control is in the OFF position.

The parking brake indicator light should come on.
3. Gradually increase the engine speed to high idle. The machine should not move.
4. Reduce the engine speed to low idle. Move the transmission direction control to the NEUTRAL position. Lower the implement to the ground. Stop the engine.

If the machine moved during the test, consult your Caterpillar dealer for a brake inspection. Make any necessary repairs before the machine is returned to operation.

Bucket Cutting Edges - Inspect/Replace

SMCS Code: 6801-040; 6801-510

WARNING

Personal injury or death can result from bucket falling.

Block the bucket before changing bucket cutting edges.

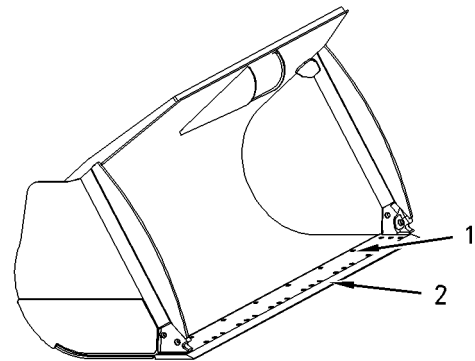


Illustration 164

g00764365

- (1) Bolts for Cutting Edge
(2) Cutting Edge

Check the cutting edges and the end bits for wear and for damage. Use the following procedure to service the cutting edges and the end bits:

1. Raise the bucket and place blocking under the bucket.
2. Lower the bucket onto the blocking. Stop the engine.
3. Remove bolts (1), cutting edge (2) and the end bits.
4. Clean all contact surfaces.
5. If the opposite side of the cutting edge is not worn, use the opposite side of the cutting edge. The end bits are not reversible.

If both sides are worn, install a new cutting edge.
6. Install bolts (1). Tighten the bolts to the specified torque.

Reference: Refer to Specifications, SENR3130, "Ground Engaging Tool (G.E.T.) Fasteners".

7. Start the engine. Raise the bucket and remove the blocking. Lower the bucket to the ground.
8. After a few hours of operation, check the bolts for proper torque.

Bucket Wear Plates

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket wear plates.

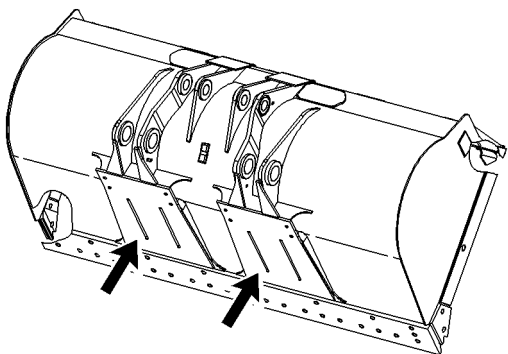


Illustration 165

g00879740

Inspect the wear plates. Replace the wear plates before damage to the bottom of the bucket occurs. Consult your Caterpillar dealer for replacement of wear plates.

Bucket Hinge and Lift Arm Clearance Shims - Inspect/Adjust/Replace

SMCS Code: 6001-025-CLR; 6001-040-CLR;
6001-510-Z4; 6119-025-CLR; 6119-040-CLR;
6119-510-Z4

Inspect the Linkage

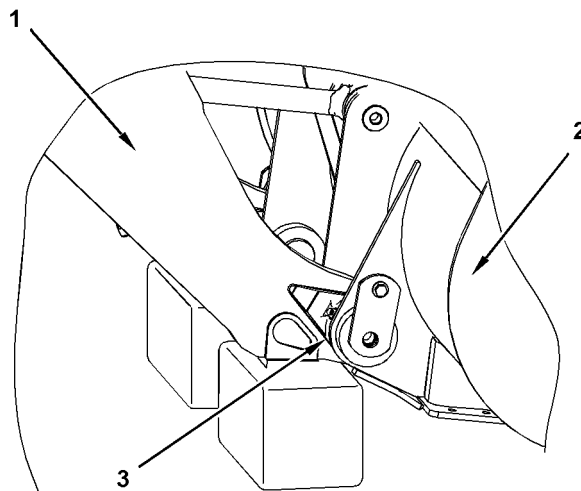


Illustration 166

g03003577

- (1) Lift Arm
(2) Bucket
(3) Inspection Points for the Bucket Hinge.

Periodically inspect the bucket linkage. The gap between the bucket and the linkage should not exceed the thinnest shim that is available for the bucket assembly.

1. Lower the lift arm assembly (1) to suitable blocking. Rest the bucket (2) on the ground.
2. Use a gauge to measure the gap at the hinge.
3. If the measurement exceeds the required amount, new shims must be installed.

Installing Shims for the Hinge on the Bucket

Note: Refer to the Disassembly and Assembly Manual, "Bucket - Remove" for the correct procedure for removing the pins in the linkage.

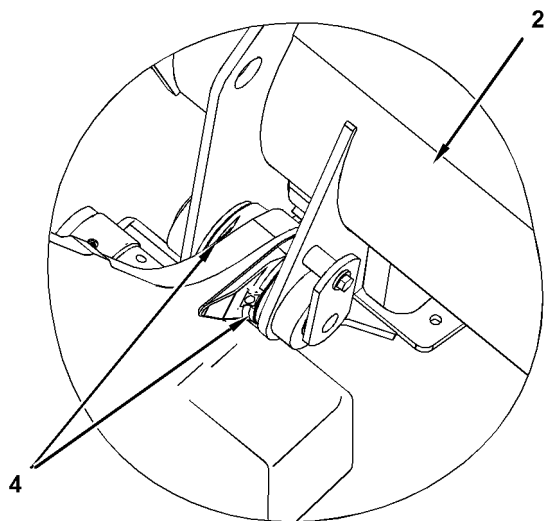


Illustration 167

g01345720

- (2) Bucket
(4) Install washers on lift arm.

Install washers and pin assembly to the bucket. When possible, use washers on both sides of the lift arm to reduce the gap between the lift arm and the hinges on the bucket.

Note: Refer to the Disassembly and Assembly Manual, "Bucket - Install" for the correct procedure for installing the pins in the linkage.

i03657090

Bucket Linkage and Loader Cylinder Bearings - Lubricate

SMCS Code: 5102-086-BD; 5104-086-BD;
6107-086-BD

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

Wipe off the fittings before any lubricant is applied.

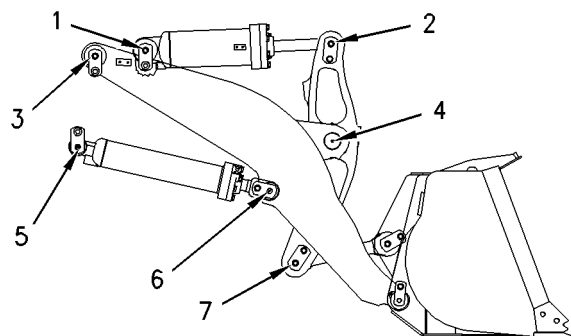


Illustration 168

g01001072

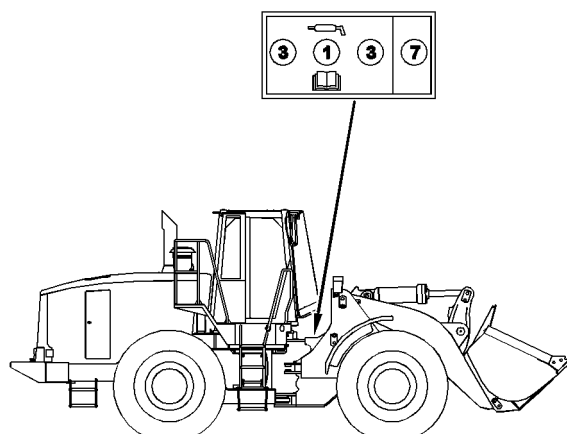


Illustration 169

g01259751

To lubricate pins (1) and (3), apply grease through the remote fittings that are located on the right side of the machine near the articulation joint.

The pins (2), (4), (5), (6), and (7) do not have remote grease fittings. These pins have standard grease fittings.

i01924084

Bucket Lower Pivot Bearings - Lubricate

SMCS Code: 6101-086-BD; 6107-086-BD

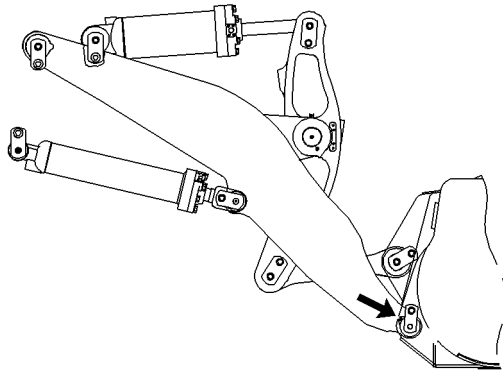


Illustration 170

g01001411

Wipe off all fittings before any lubricant is applied.

Apply lubricant through one fitting on each side of the machine.

i03657242

Bucket Tips - Inspect/Replace

SMCS Code: 6805-040; 6805-510

WARNING

Personal injury or death can result from the bucket falling.

Block the bucket before changing bucket tips.

Bucket Tips

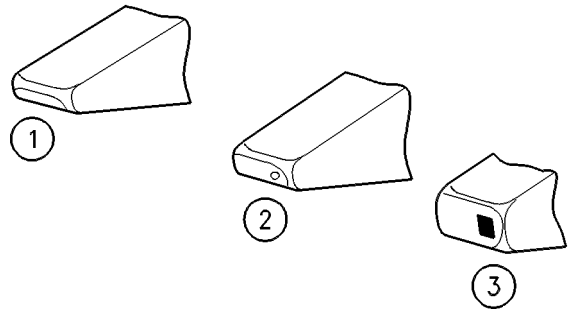


Illustration 171

g00101352

- (1) Usable
- (2) Replace the tip.
- (3) Replace the tip.

Check the bucket tips for wear. If the bucket tip has a hole, replace the bucket tip.

1. Remove the pin from the bucket tip. The pin can be removed by one of the following methods.
 - Use a hammer and a punch from the retainer side of the bucket to drive out the pin.
 - Use a Pin-Master. Follow Step 1.a through Step 1.c for the procedure.

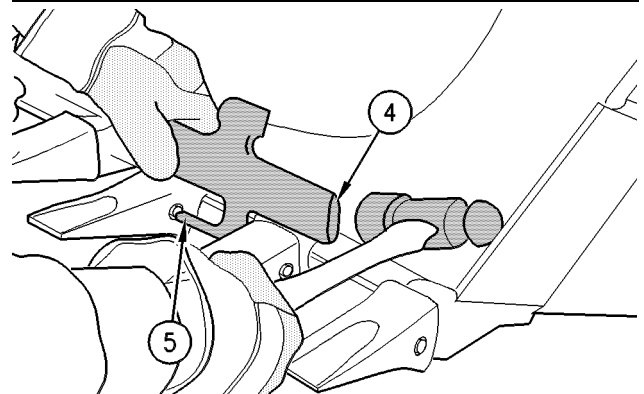


Illustration 172

g00590670

- (4) Back of Pin-Master
- (5) Extractor

- a. Place the Pin-Master on the bucket tooth.
- b. Align extractor (5) with the pin.
- c. Strike the Pin-Master at the back of the tool (4) and remove the pin.

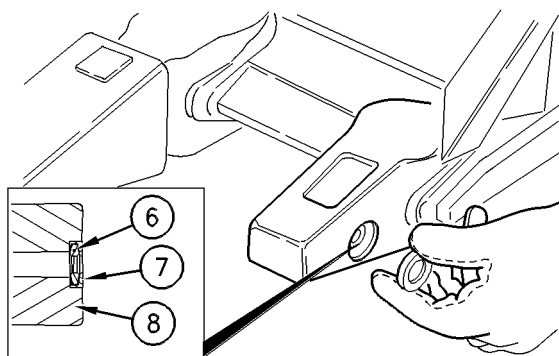


Illustration 173

g00590819

- (6) Retainer
(7) Retaining washer
(8) Adapter

2. Clean the adapter and the pin.

3. Fit retainer (6) into retaining washer (7). Install this assembly into the groove that is in the side of adapter (8).

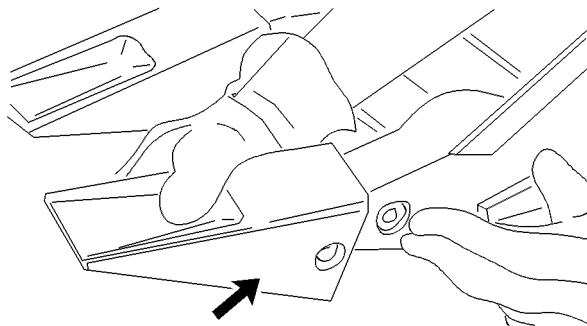


Illustration 174

g00101359

4. Install the new bucket tip onto the adapter.

Note: The bucket tip can be rotated by 180 degrees in order to allow greater penetration or less penetration.

5. Drive the pin through the bucket tip. The pin can be installed by using one of the following methods:

- From the other side of the retainer, drive the pin through the bucket tip, the adapter, and the retainer.
- Use a Pin-Master. Follow Step 5.a through Step 5.e for the procedure.

Note: To correctly install the pin into the retainer, the pin must be driven in from the right side of the tooth. Improper installation of the pin can result in the loss of the bucket tip.

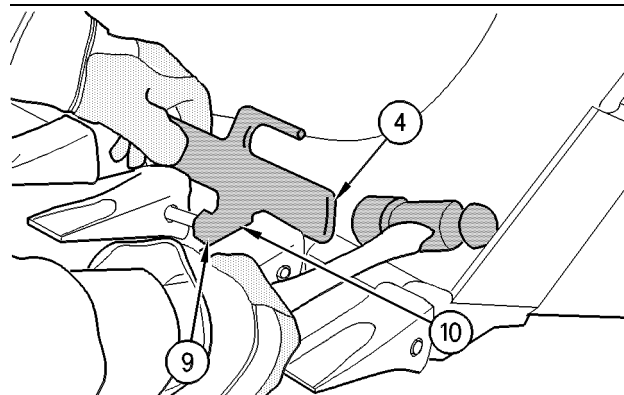


Illustration 175

g00590666

- (4) Back of Pin-Master
(9) Pin setter
(10) Pin holder

- Insert the pin through the bucket tooth.
- Place the Pin-Master over the bucket tooth and locate the pin in the hole of holder (10).
- Strike the tool with a hammer at the back of the tool (4) in order to start the pin.
- Slide pin holder (10) away from the pin and rotate the tool slightly in order to align pin setter (9) with the pin.
- Strike the end of the tool until the pin is fully inserted.

6. After you drive the pin, make sure that the retainer fits snugly into the pin groove.

K-Series Tip

Removal

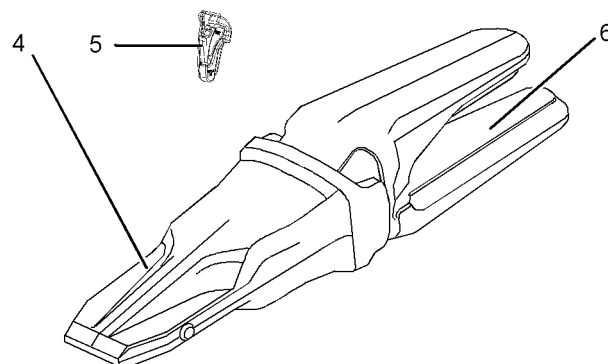


Illustration 176

g01389463

Note: Retainers are often damaged during the removal process. Caterpillar recommends the installation of a new retainer when bucket tips are rotated or replaced.

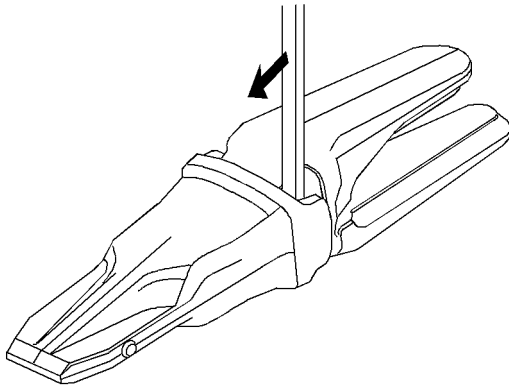


Illustration 177

g01175361

1. Use a pry bar in order to disengage retainer (5).
2. Use the pry bar in order to remove retainer (5) from bucket tip (4).
3. Remove bucket tip (4) from adapter (6) with a slight counterclockwise rotation.
4. Clean adapter (6).

Installation

1. Clean the adapter and the area around the latch, if necessary.
2. Install the new bucket tip onto the adapter with a slight clockwise rotation.

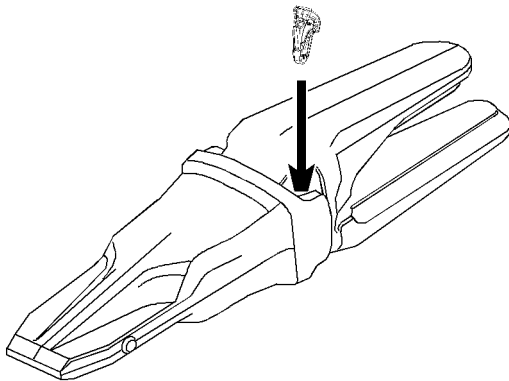


Illustration 178

g01124736

3. Install the retainer. Make sure that the retainer's latch catches under the tip pocket.
4. Make sure that the latch is properly seated by trying to remove the bucket tip.

Bucket Upper Pivot Bearings - Lubricate

SMCS Code: 6101-086-BD; 6107-086-BD

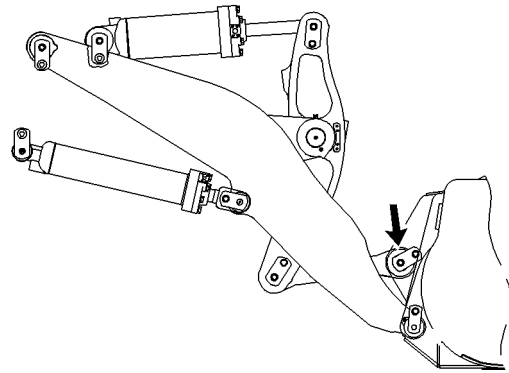


Illustration 179

g01001416

Wipe off the fitting before any lubricant is applied.

Apply lubricant through the fitting.

Cab Air Filter - Clean/Replace

SMCS Code: 7342-070; 7342-510

Note: Clean the cab air filters more often if the machine is being operated in dusty conditions.

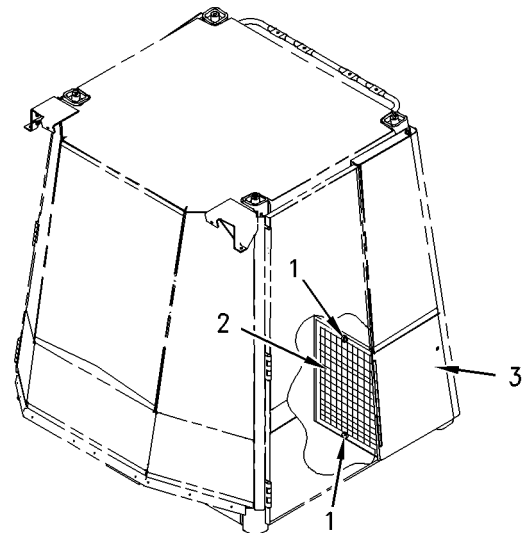


Illustration 180

g00759048

1. Remove the filter cover behind the seat. Two threaded knobs (1) are used in order to remove the cover. Remove the filter element (2).
2. Open the access door (3) on the left side of the cab. Remove the filter element.
3. Clean the filter elements with pressure air or wash the filter elements in warm water with a nonsudsing household detergent.
4. If water and detergent are used to clean the filter elements, rinse the filter elements in clean water and allow the filter elements to air dry thoroughly.

Note: If either filter element is damaged, install a new filter element.

5. Install the filter elements. Install the filter cover and close the access door.

i02816405

Camera - Clean (If Equipped)

SMCS Code: 7348-070

In order to maintain sufficient vision, keep the Work Area Vision System (WAVS) camera lens and the display clean.

Display

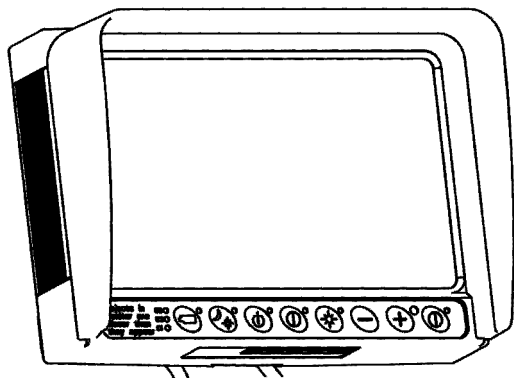


Illustration 181

g01223034

WAVS display

Use a soft, damp cloth in order to clean the display. The display has a soft plastic surface that can be easily damaged by an abrasive material. **The display is not sealed. Do not immerse the display with liquid.**

Camera

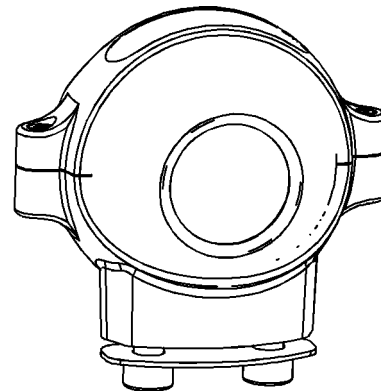


Illustration 182

g01223051

The WAVS camera is located on the rear of the machine in the center of the fan guard.

Use a damp cloth or water spray in order to clean the camera lens. The camera is a sealed unit. The camera is not affected by high pressure spray.

The camera is equipped with an internal heater to help counteract the effects of condensation, snow, or ice.

Note: For more information on WAVS, refer to Operation and Maintenance Manual, SEBU8157, "Work Area Vision System".

i03696954

Circuit Breakers - Reset

SMCS Code: 1420-529

The circuit breaker panel is located on the left side of the machine under the front of the cab next to the battery box.

i01921776

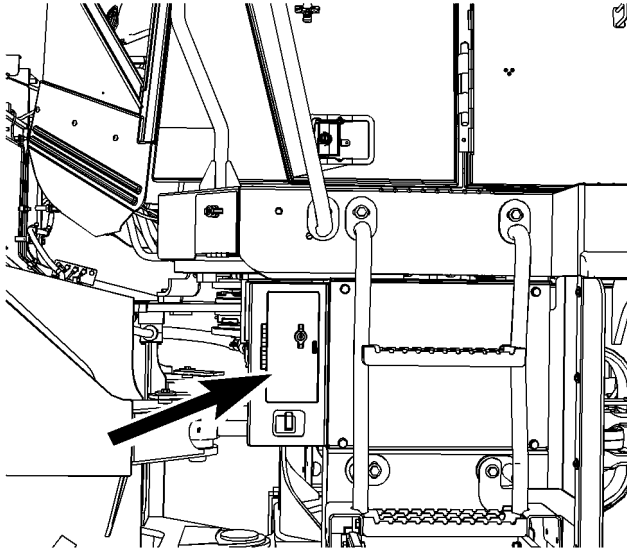


Illustration 183

g01988115

Depress the button in order to reset the circuit breakers. If the circuit is functioning properly, the button will remain depressed. If the button will not remain depressed, check the appropriate electrical circuit.

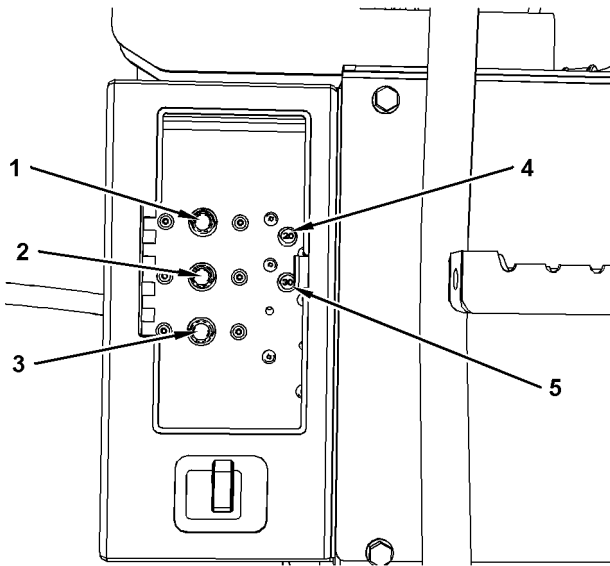


Illustration 184

g01988117

- (1) 50 Amp Circuit Breaker
- (2) 90 Amp Circuit Breaker
- (3) 80 Amp Circuit Breaker
- (4) 20 Amp Circuit Breaker
- (5) 30 Amp Circuit Breaker

Cooling System Coolant (ELC) - Change

SMCS Code: 1350-044-NL

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Reference: For information about adding Extender to your cooling system, refer to Operation and Maintenance Manual, "Cooling System Coolant Extender (ELC) - Add" or consult your Caterpillar dealer.

If an Extended Life Coolant was previously used, flush the cooling system with clean water. No other cleaning agents are required. Use the following procedure to change the Extended Life Coolant.

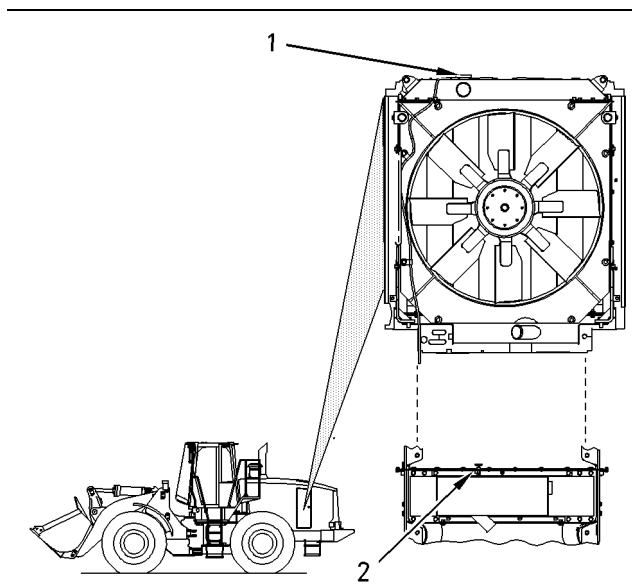


Illustration 185

g00807153

The cooling system pressure cap (1) is located under the engine hood at the rear of the machine.

1. Slowly loosen the cooling system pressure cap in order to relieve any system pressure.
2. Open the access door on the left side of the machine in order to access coolant drain valve (2). Open the drain valve at the bottom of the radiator. Allow the coolant to drain into a suitable container.
3. Flush the cooling system with clean water until the draining water is clean. Close drain valve (2).
4. Replace the water temperature regulator.

Reference: Refer to Operation and Maintenance Manual, "Cooling System Water Temperature Regulator - Replace" for the correct procedure.

NOTICE

Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

5. Add the Extended Life Coolant.

Reference: Refer to Operation and Maintenance Manual, "Capacities (Refill)" for the capacity of the cooling system.

6. Start the engine. Run the engine without the cooling system pressure cap until the water temperature regulator opens and the coolant level stabilizes.

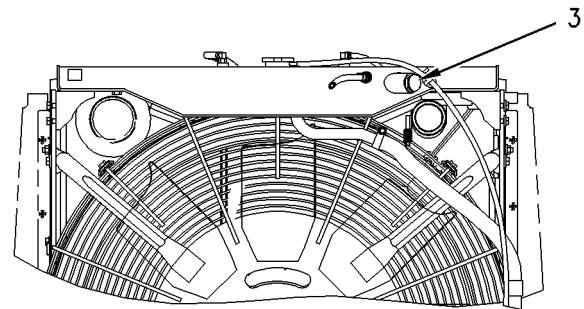


Illustration 186

g01000160

7. Maintain the coolant level in sight gauge (3) on the upper radiator.
8. Install the cooling system pressure cap. Stop the engine.

i01921794

Cooling System Coolant Extender (ELC) - Add

SMCS Code: 1352-544-NL

⚠ WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Topping off or mixing Cat ELC with other products that do not meet Caterpillar EC-1 specifications reduces the effectiveness of the coolant and shortens coolant service life.

Use only Caterpillar products or commercial products that have passed the Caterpillar EC-1 specification for pre-mixed or concentrate coolants. Use only Extender with Cat ELC.

Failure to follow these recommendations can result in shortened cooling system component life.

When a Caterpillar Extended Life Coolant (ELC) is used, an Extender must be added to the cooling system.

Use a 8T-5296 Coolant Test Kit to check the concentration of the coolant.

Reference: For additional information about the addition of Extender, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

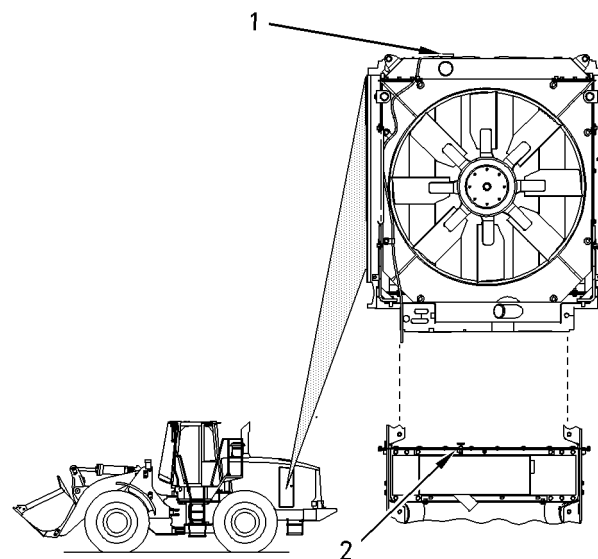


Illustration 187

g00807153

Cooling system pressure cap (1) is located under the hood at the rear of the machine. Tilt the hood in order to access the cooling system pressure cap.

1. Slowly loosen the cooling system pressure cap in order to relieve any system pressure. Remove the cooling system pressure cap.
 2. If necessary, drain enough coolant from the radiator in order to allow the addition of the Extender to the cooling system. The cooling system drain valve (2) is located on the lower left side of the radiator.
 3. Add 1.18 L (40 fl oz) of Extender to the cooling system.
-

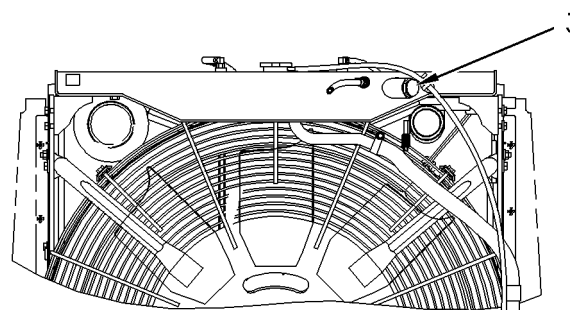


Illustration 188

g01000160

4. Check the coolant level at sight gauge (3).

Reference: Refer to Operation and Maintenance Manual, "Cooling System Coolant Level - Check" for the correct procedure.

5. Install the cooling system pressure cap. Close the engine hood.

i01921821

Cooling System Coolant Level - Check

SMCS Code: 1350-535-FLV

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

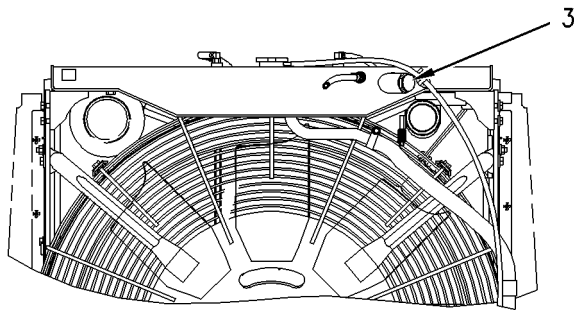


Illustration 189

g01000175

Open the access door on the left side of the machine. Coolant level sight gauge (1) is located on the top radiator.

Maintain the coolant level within the sight gauge. Add coolant, if necessary.

Note: If it is necessary to add coolant daily, inspect the cooling system for leaks.

i02375131

Cooling System Coolant Sample (Level 1) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

Note: It is not necessary to obtain a Coolant Sample (Level 1) if the cooling system is filled with Cat ELC (Extended Life Coolant). Cooling systems that are filled with Cat ELC should have a Coolant Sample (Level 2) that is obtained at the recommended interval that is stated in the Maintenance Interval Schedule.

Note: Obtain a Coolant Sample (Level 1) if the cooling system is filled with any other coolant instead of Cat ELC. This includes the following types of coolants.

- Commercial long life coolants that meet the Caterpillar Engine Coolant Specification -1 (Caterpillar "EC-1")
- Cat Diesel Engine Antifreeze/Coolant (DEAC)
- Commercial heavy-duty coolant/antifreeze

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

Note: Level 1 results may indicate a need for Level 2 Analysis.

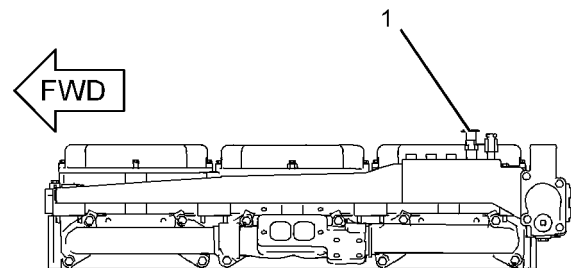


Illustration 190

g01185306

Left side of machine

The sampling valve (1) for the cooling system is located on top of the engine toward the front of the engine on the left side of the machine.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. In order to receive the full effect of S·O·S analysis, you must establish a consistent trend of data. In order to establish a pertinent history of data, perform consistent samplings that are evenly spaced. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Use the following guidelines for proper sampling of the coolant:

- Complete the information on the label for the sampling bottle before you begin to take the samples.

- Keep the unused sampling bottles stored in plastic bags.
- Obtain coolant samples directly from the coolant sample port. You should not obtain the samples from any other location.
- Keep the lids on empty sampling bottles until you are ready to collect the sample.
- Place the sample in the mailing tube immediately after obtaining the sample in order to avoid contamination.
- Never collect samples from expansion bottles.
- Never collect samples from the drain for a system.

Submit the sample for Level 1 analysis.

For additional information about coolant analysis, see Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

i02375133

Cooling System Coolant Sample (Level 2) - Obtain

SMCS Code: 1350-008; 1395-008; 7542

NOTICE

Always use a designated pump for oil sampling, and use a separate designated pump for coolant sampling. Using the same pump for both types of samples may contaminate the samples that are being drawn. This contaminate may cause a false analysis and an incorrect interpretation that could lead to concerns by both dealers and customers.

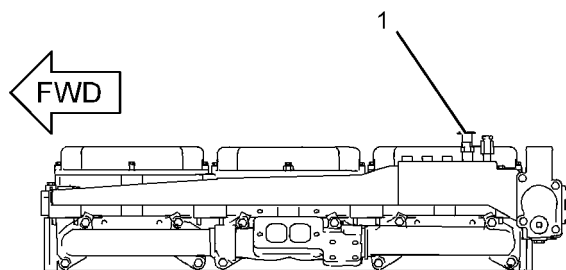


Illustration 191

g01185306

Left side of the machine

The sampling valve (1) for the cooling system is located on top of the engine toward the front of the engine on the left side of the machine.

Obtain the sample of the coolant as close as possible to the recommended sampling interval. Supplies for collecting samples can be obtained from your Caterpillar dealer.

Refer to Operation and Maintenance Manual, "Cooling System Coolant Sample (Level 1) - Obtain" for the guidelines for proper sampling of the coolant.

Submit the sample for Level 2 analysis.

Reference: For additional information about coolant analysis, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" or consult your Caterpillar dealer.

i02186511

Cooling System Water Temperature Regulator - Replace

SMCS Code: 1355-510; 1393-010

WARNING

Pressurized system: Hot coolant can cause serious burn. To open cap, stop engine, wait until radiator is cool. Then loosen cap slowly to relieve the pressure.

NOTICE

Failure to replace the engine's thermostat on a regularly scheduled basis could cause severe engine damage.

NOTICE

Caterpillar engines incorporate a shunt design cooling system and require operating the engine with a thermostat installed.

If the thermostat is installed wrong, it will cause the engine to overheat. Inspect gaskets before assembly and replace if worn or damaged.

i02164355

Differential and Final Drive Oil - Change

SMCS Code: 3278-044; 4011-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

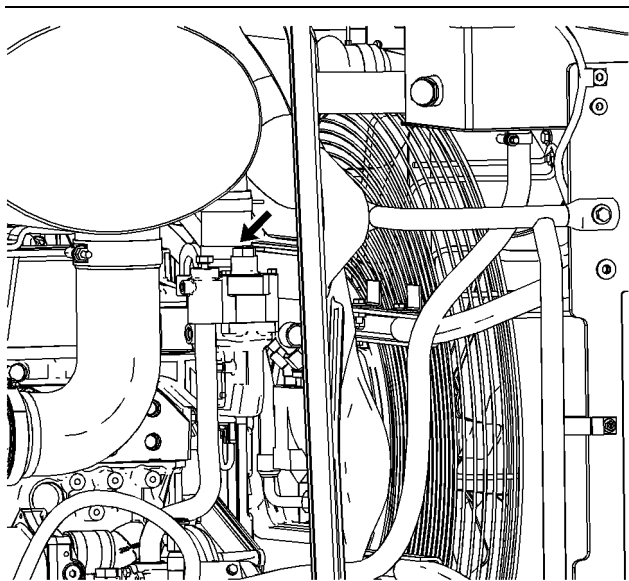


Illustration 192

g01105775

Replace the water temperature regulator in order to reduce the chance of problems with the cooling system.

Replace the water temperature regulator and the seals while the cooling system is completely drained or while the coolant is drained to a level that is below the water temperature regulator housing.

Note: If you are only replacing the water temperature regulator, drain the coolant to a level that is below the water temperature regulator housing.

Reference: Refer to Disassembly and Assembly, RENR9214, "C11 and C13 Engines for Caterpillar Built Machines" for the correct procedure for replacing the water temperature regulator.

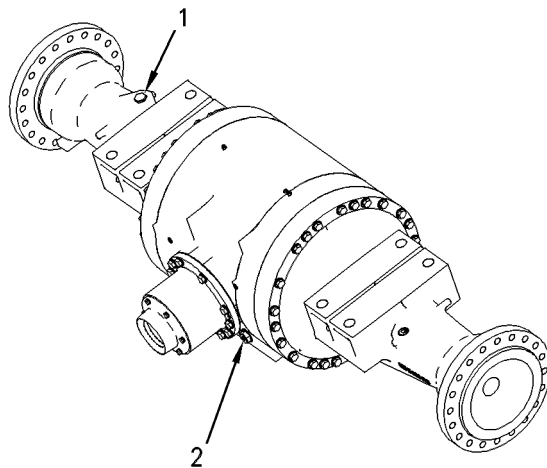


Illustration 193

Front axle

g00287529

i01102280

Differential and Final Drive Oil Level - Check

SMCS Code: 3278-535-FLV; 4011-535-FLV

Note: Before you measure the oil level, operate the machine for a few minutes in order to equalize the oil level.

1. Park the machine on level ground. Lower the bucket and apply slight downward pressure. Engage the parking brake. Stop the engine.

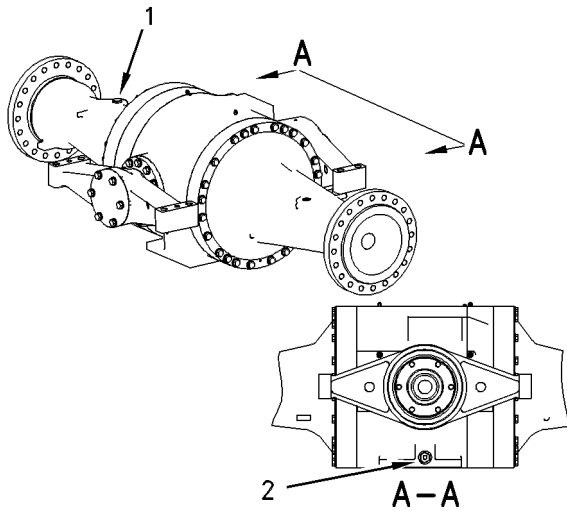


Illustration 194

g00287531

Rear axle

Note: The axle housings are equipped with ecology drain valves.

1. Remove drain plugs (2). Attach a hose to a suitable drain adapter. Install the adapter in the drain valve and allow the oil to drain into a suitable container.
2. Clean the drain plugs and install the drain plugs.
3. Wipe off dipstick/fill plugs (1) and the surfaces around dipstick/fill plugs (1).
4. Remove the dipstick/fill plugs. Fill each axle with 1.0 L (1.06 qt) of 1U-9891 Hydraulic Oil Additive. Fill the axles with oil.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the type of lubricant and for the refill capacity.

5. Clean the dipstick/fill plugs and install the dipstick/fill plugs.
6. Run the machine on level ground for a few minutes in order to equalize the oil level in the axle. Check the oil level in the axle.

Reference: Refer to Operation and Maintenance Manual, "Differential and Final Drive Oil Level - Check" for the correct procedure.

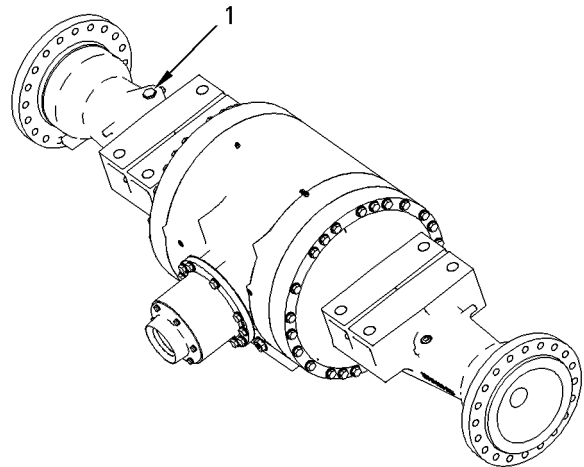


Illustration 195

g00285312

Front Axle

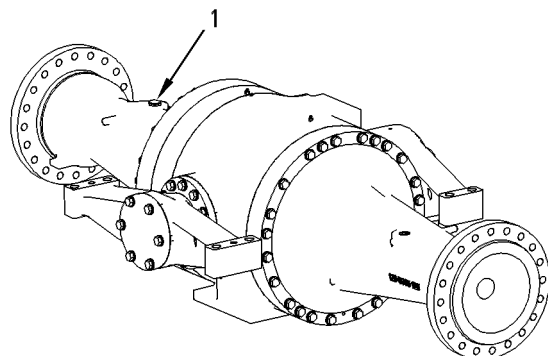


Illustration 196

g00287527

Rear Axle

2. Remove dipstick/fill plug (1) on the left side of the axle. Wipe off the level gauge with a clean cloth and reinsert the plug. This will ensure a more accurate measurement of the oil level.

Note: Make sure that the plug is installed completely before you check the oil level. If the plug is not installed completely, an incorrect oil level reading can occur.

3. Remove dipstick/fill plug (1) again and check the oil level. Maintain the oil level between the ADD mark and the FULL mark. Add oil, if necessary.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the type of lubricant and for the refill capacity.

4. Clean the plug and install the plug.

i01921974

Differential and Final Drive Oil Sample - Obtain

SMCS Code: 3278-008; 4011-008; 4070-008; 7542

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the differential oil for a more accurate sample.

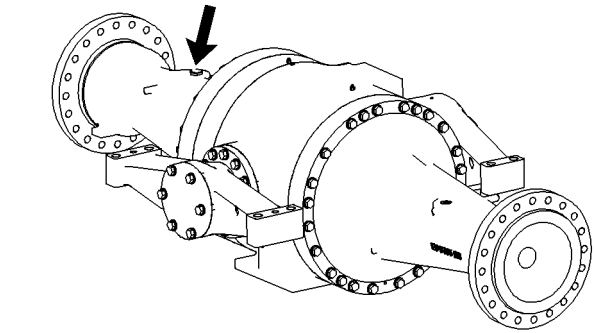


Illustration 197

g00884056

Rear axle

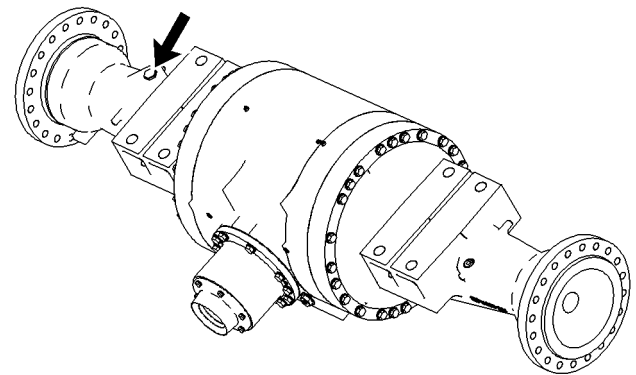


Illustration 198

g00884059

Front axle

2. The differential and final drives are not equipped with sampling valves. Obtaining an oil sample will require the use of a vacuum pump or equivalent in order to extract the oil from the component. Extract the oil through the filler openings on the differential and final drives.

3. Complete any additional required work. Fill the differential and final drives with oil, as required. Install the dipstick/fill plugs.

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S·O·S Oil Analysis" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i03657243

Drive Shaft Spline (Center) - Lubricate

SMCS Code: 3253-086-SN

Wipe all of the fittings before you apply grease to the fittings.

NOTICE

To prevent damage to the seal, articulate the machine full right or left, before lubricating the splines.

1. Start the engine. Raise the bucket. Release the parking brake. Articulate the machine to the right or to the left in order to properly lubricate the splined shaft.
2. Lower the bucket to the ground. Engage the parking brake. Stop the engine.

Note: Since the steering frame lock cannot be connected in this case, remove the engine start switch key and turn the battery disconnect switch to the OFF position.

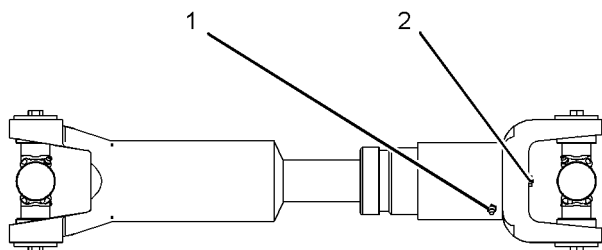


Illustration 199

g01106848

3. Apply grease to the fitting (1). Apply grease until the relief (2) overruns.

Note: 5P-0960 Molybdenum Grease is preferred. 1P-0808 Multipurpose Grease may be used.

4. Start the engine. Raise the bucket. Release the parking brake. Reposition the machine in a straight direction without articulation.
5. Lower the bucket to the ground. Apply a slight down pressure. Engage the parking brake. Stop the engine.

i04040803

Drive Shaft Support Bearing - Lubricate

SMCS Code: 3267-086-BD

This procedure is to lubricate the drive shaft support bearings that have a grease fitting. Some previous drive shaft support bearings are lubricated for life. Drive shaft support bearings that are lubricated for life do not have grease fittings.

Note: For better access, articulate the machine to the right or to the left. Because the steering frame lock cannot be connected, remove the engine start switch key. Turn the battery disconnect switch to the OFF position in order to keep the machine from being articulated.

In order to lubricate the drive shaft support bearing, remove the plug if a grease zerk is not installed. Install a grease zerk. **Do not grease the drive shaft support bearing more than the recommended interval.**

NOTICE

Do not over grease the drive shaft support bearing. The excess grease may get into the brake area. Damage to the brakes or the loss of the brakes may occur. Take precautions in order to avoid getting grease in the adjacent brake area.

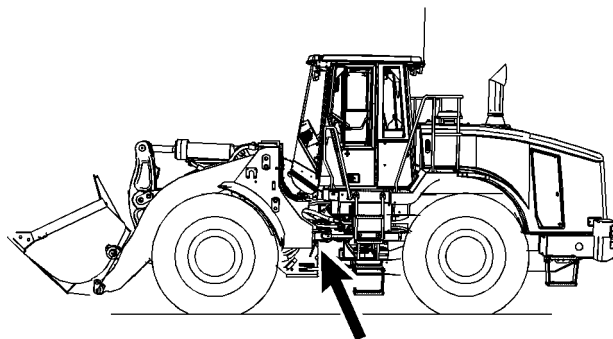


Illustration 200

g01962154

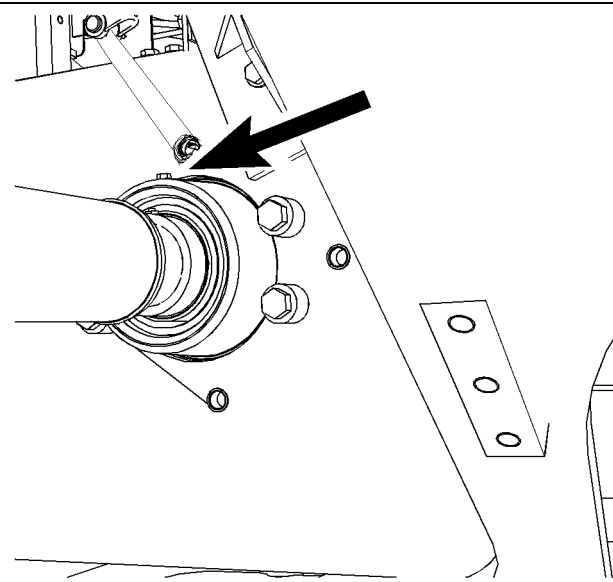


Illustration 201

g02247513

Wipe off the fitting before any lubricant is applied.

Apply lubricant through the fitting on the drive shaft support bearing. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the proper grease.

i02571972

Drive Shaft Universal Joints - Lubricate

SMCS Code: 3251-086

Note: Do not grease the universal joints more than the recommended interval.

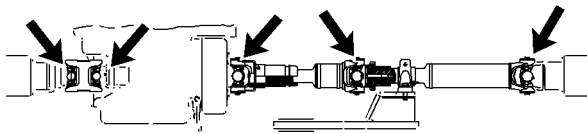


Illustration 202

g01069141

1. Wipe off the grease fittings before lubricating.
2. Lubricate all five grease fittings on the universal joints. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the proper grease.

i02061807

Electronic Unit Injector - Inspect/Adjust

SMCS Code: 1251-025; 1251-040; 1290-025; 1290-040

WARNING

The Electronic Control module produces high voltage. To prevent personal injury make sure the Electronic Control Module is not powered and the unit injector solenoids are disconnected.

NOTICE

The camshafts must be correctly timed with the crankshaft before an adjustment of the unit injector lash is made. The timing pins must be removed from the camshafts before the crankshaft is turned or damage to the cylinder block will be the result.

The operation of Caterpillar engines with improper adjustments of the electronic unit injector can reduce engine efficiency. This reduced efficiency could result in excessive fuel usage and/or shortened engine component life.

Adjust the electronic unit injector at the same interval as the valve lash adjustment.

Refer to your machine's Service Manual or your Caterpillar dealer for the complete adjustment procedure.

i02187095

Engine Air Filter Primary Element - Clean/Replace

SMCS Code: 1054-070-PY; 1054-510-PY

1. The rear hood should be opened in order to access the air filter. The air filter is located on the right side of the machine.

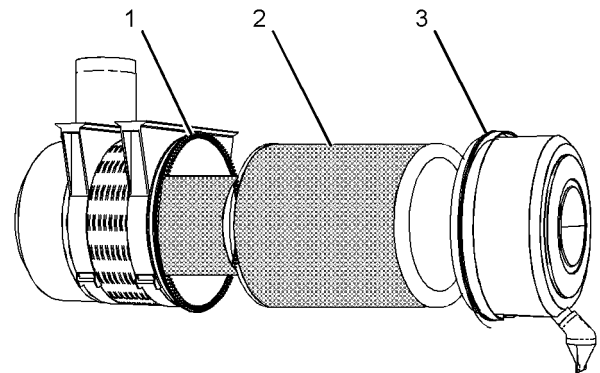


Illustration 203

g01105972

2. Remove the cover on air filter housings (3).
3. Remove primary element (2) from the air filter housing.
4. Clean the inside of air filter housing (1).
5. Inspect the primary element. If the pleats, the gaskets, or the seals are damaged, discard the element. Replace a damaged primary element with a clean primary element.

Cleaning Primary Air Filter Elements

NOTICE

Caterpillar recommends certified air filter cleaning services available at participating Caterpillar dealers. The Caterpillar cleaning process uses proven procedures to assure consistent quality and sufficient filter life.

Observe the following guidelines if you attempt to clean the filter element:

Do not tap or strike the filter element in order to remove dust.

Do not wash the filter element.

Use low pressure compressed air in order to remove the dust from the filter element. Air pressure must not exceed 207 kPa (30 psi). Direct the air flow up the pleats and down the pleats from the inside of the filter element. Take extreme care in order to avoid damage to the pleats.

Do not use air filters with damaged pleats, gaskets, or seals. Dirt entering the engine will cause damage to engine components.

The primary air filter element can be used up to six times if the element is properly cleaned and the element is inspected. When the primary air filter element is cleaned, check for rips or tears in the filter material. The primary air filter element should be replaced at least one time per year. This replacement should be performed regardless of the number of cleanings.

NOTICE

Do not clean the air filter elements by bumping or tapping. This could damage the seals. Do not use elements with damaged pleats, gaskets, or seals. Damaged elements will allow dirt to pass through. Engine damage could result.

Visually inspect the primary air filter elements before cleaning. Inspect the air filter elements for damage to the seal, the gaskets, and the outer cover. Discard any damaged air filter elements.

There are two common methods that are used to clean primary air filter elements:

- Pressurized air
- Vacuum cleaning

Pressurized Air

Pressurized air can be used to clean primary air filter elements that have not been cleaned more than two times. Pressurized air will not remove deposits of carbon and oil. Use filtered, dry air with a maximum pressure of 207 kPa (30 psi).

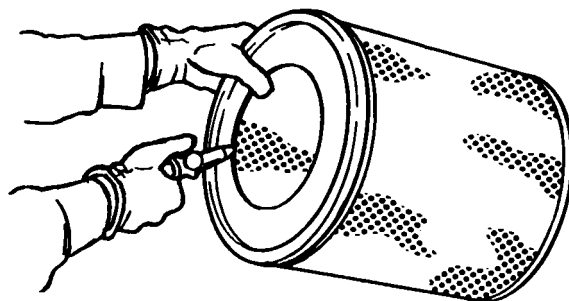


Illustration 204

g00281692

Note: When the primary air filter elements are cleaned, always begin with the clean side (inside) in order to force dirt particles toward the dirty side (outside).

Aim the hose so that the air flows inside the element along the length of the filter in order to help prevent damage to the paper pleats. Do not aim the stream of air directly at the primary air filter element. Dirt could be forced further into the pleats.

Vacuum Cleaning

Vacuum cleaning is another method for cleaning primary air filter elements which require daily cleaning because of a dry, dusty environment. Cleaning with pressurized air is recommended prior to vacuum cleaning. Vacuum cleaning will not remove deposits of carbon and oil.

Inspecting the Primary Air Filter Elements

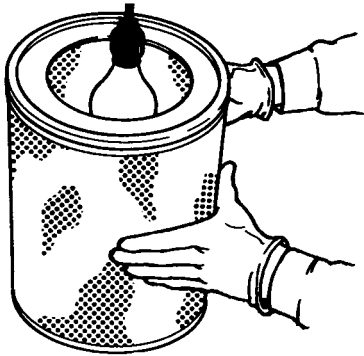


Illustration 205

g00281693

Inspect the clean, dry primary air filter element. Use a 60 watt blue light in a dark room or in a similar facility. Place the blue light in the primary air filter element. Rotate the primary air filter element. Inspect the primary air filter element for tears and/or holes. Inspect the primary air filter element for light that may show through the filter material. If it is necessary in order to confirm the result, compare the primary air filter element to a new primary air filter element that has the same part number.

Do not use a primary air filter element that has any tears and/or holes in the filter material. Do not use a primary air filter element with damaged pleats, gaskets or seals. Discard damaged primary air filter elements.

Storing Primary Air Filter Elements

If a primary air filter element that passes inspection will not be used, the primary air filter element can be stored for future use.

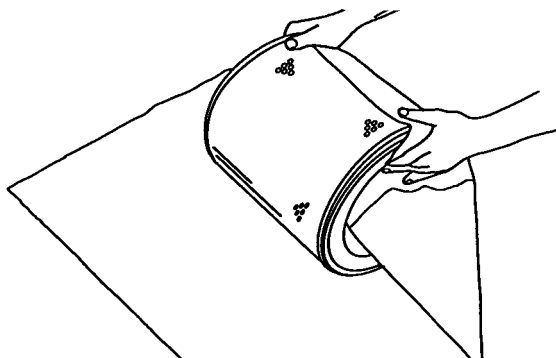


Illustration 206

g00281694

Do not use paint, a waterproof cover, or plastic as a protective covering for storage. An airflow restriction may result. To protect against dirt and damage, wrap the primary air filter elements in Volatile Corrosion Inhibited (VCI) paper.

Place the primary air filter element into a box for storage. For identification, mark the outside of the box and mark the primary air filter element. Include the following information:

- Date of cleaning
- Number of cleanings

Store the box in a dry location.

i01693619

Engine Air Filter Secondary Element - Replace

SMCS Code: 1054-510-SE

NOTICE

Service the air filter only with the engine stopped. Engine damage could result.

NOTICE

Always replace the secondary element. Do not attempt to reuse it by cleaning. Engine damage could result.

Note: Replace the secondary element when you service the primary element for the third time. If a clean primary element has been installed and a warning for the air filter still occurs, replace the secondary element. Also if the exhaust smoke remains black and a clean primary element has been installed, replace the secondary element.

1. Remove the primary element.

Reference: Refer to Operation and Maintenance Manual, "Engine Air Filter Primary Element - Clean/Replace" for the correct procedure.

i02197033

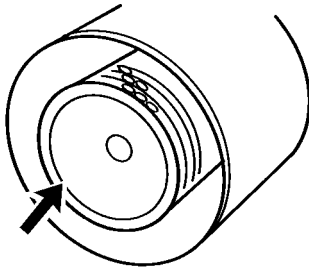


Illustration 207

g00864077

2. Remove the secondary element.

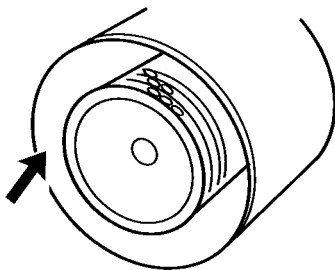


Illustration 208

g00864079

3. Cover the air inlet opening. Clean the inside of the air cleaner housing.
4. Inspect the gasket between the air inlet pipe and the air cleaner housing. Replace the gasket if the gasket is damaged.
5. Uncover the air inlet opening. Install a new secondary element.
6. Install a clean primary element and the cover for the air cleaner housing.
7. Close the access door.
8. Repeat the procedure for the other air cleaner.

Engine Crankcase Breather - Clean

SMCS Code: 1317-070

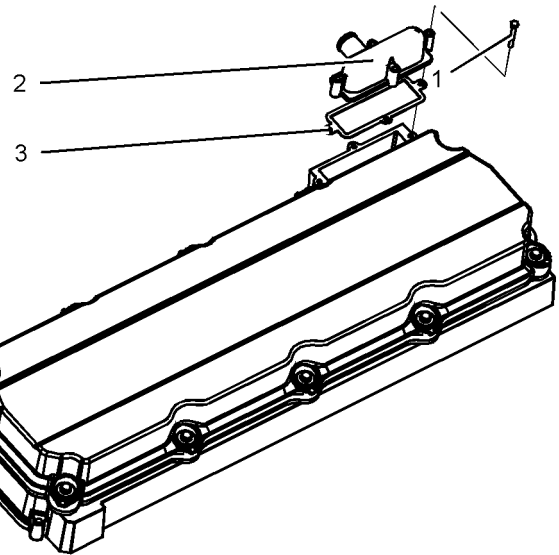


Illustration 209

g01109682

Open the hood on the rear of machine in order to access the engine compartment. The crankcase breather is located on the right side of the engine.

1. Remove the four bolts (1) that hold the breather (2) onto the cover. Remove the breather.
2. Check the condition of the cover seal (3). Replace the seal if the seal is damaged.
3. Wash the breather (2) and the filter element in a clean nonflammable solvent. The filter element is located inside the breather.
4. Shake the breather or use pressure air in order to dry the breather.
5. Inspect the breather hose for damage. Replace the breather hose if it is necessary.
6. Install the breather assembly. Install the hose and install the hose clamp.
7. Close the access door.

i02188149

Engine Oil Level - Check

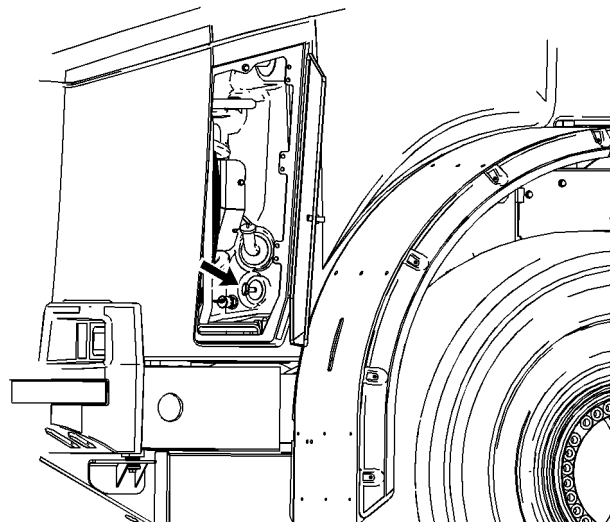
SMCS Code: 1000-535-FLV

Illustration 210

g01106343

Open the service door that is located on the right side of the machine. The oil level dipstick is located in the service door.

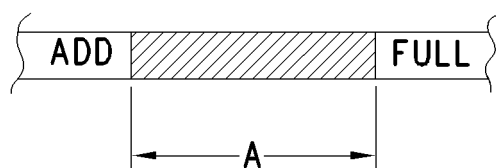


Illustration 211

g00746755

Maintain the oil level between the FULL mark and ADD mark on the dipstick. Check the level of the engine oil while the engine is shut off. Add oil, if necessary.

i02188187

Engine Oil Sample - Obtain

SMCS Code: 1348-008; 7542

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the engine oil for a more accurate sample.
2. Open the engine hood.

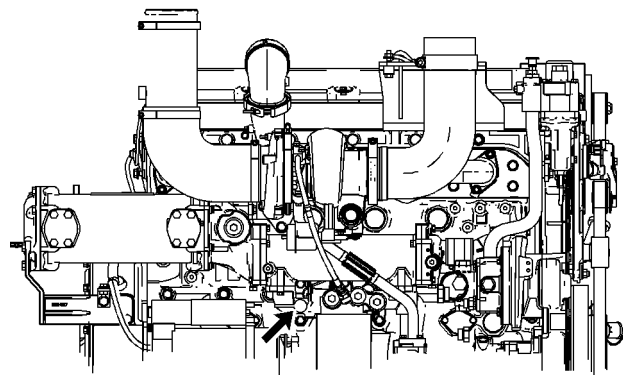


Illustration 212

g01106355

3. Use the sampling valve in order to obtain a sample of engine oil.
4. Close the engine hood.

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S-O-S Oil Analysis" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i03649999

Engine Oil and Filter - Change

SMCS Code: 1318-510

Selection of the Oil Change Interval

NOTICE

A 500 hour engine oil change interval is available, provided that the operating conditions and recommended multigrade oil types are met. When these requirements are not met, shorten the oil change interval to 250 hours, or use an S·O·S Services oil sampling and analysis program to determine an acceptable oil change interval.

If you select an interval for oil and filter change that is too long, you may damage the engine.

The normal engine oil change interval is listed in this Operation and Maintenance Manual, "Maintenance Interval Schedule".

Abnormally harsh operating cycles or harsh environments can shorten the service life of the engine oil. Arctic temperatures, corrosive environments, or extremely dusty conditions may require a reduction in engine oil change intervals. Also refer to Special Publication, SEBU5898, "Cold Weather Recommendations for All Caterpillar Machines". Poor maintenance of air filters or of fuel filters requires reduced oil change intervals. Consult your Caterpillar dealer for more information if this product will experience abnormally harsh operating cycles or harsh environments.

Adjustment of the Oil Change Interval

Note: Your Caterpillar dealer has additional information on these programs.

Cat oil filters are recommended.

Program A

Verification for an Oil Change Interval of 500 Hours

This program consists of three oil change intervals of 500 hours. Oil sampling and analysis is done at 250 hours and 500 hours for each of the three intervals for a total of six oil samples. The analysis includes oil viscosity and infrared (IR) analysis of the oil. If all of the results are satisfactory, the 500 hour oil change interval is acceptable for the machine in that application. Repeat Program A if you change the application of the machine.

If a sample does not pass the oil analysis, take one of these actions:

- Shorten the oil change interval to 250 hours.
- Proceed to Program B.
- Change to a preferred oil type in the "Lubricant Viscosities for Ambient Temperatures" Table in this Operation and Maintenance Manual

Program B

Optimizing Oil Change Intervals

Begin with a 250 hour oil change interval. The oil change intervals are adjusted by increments. Each increment is an additional 50 hours. Periodic oil sampling and analysis is done during each interval. The analysis includes oil viscosity and infrared (IR) analysis of the oil. Repeat Program B if you change the application of the machine.

If an oil sample does not pass the analysis, shorten the oil change interval, or change to a preferred multigrade oil type in the listing above.

References

Reference: Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations"

Reference: Special Publication, SEBU5898, "Cold Weather Recommendations for All Caterpillar Machines"

Reference: Special Publication, PEDP7035, "Optimizing Oil Change Intervals"

Reference: Special Publication, PEDP7036, "S·O·S Fluid Analysis"

Reference: Special Publication, PEDP7076, "Understanding the S·O·S Oil Analysis Tests"

Procedure for Changing the Oil

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Open the engine hood.
2. The drain plug is located on the left side of the engine oil pan toward the rear of the machine. Open the oil drain valve and allow the oil to drain into a suitable container. Close the drain valve.

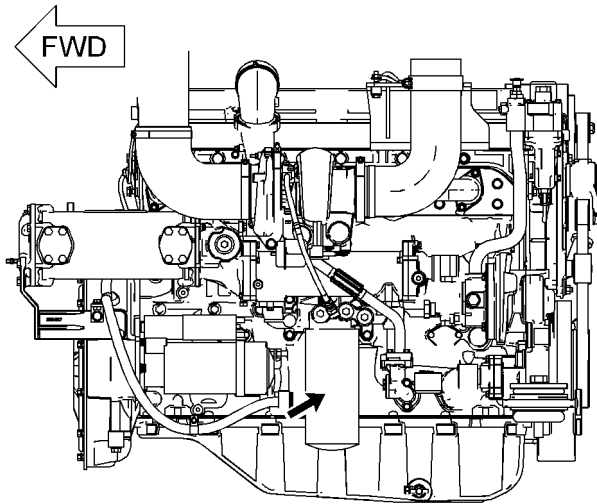


Illustration 213

g01109909

3. Use a strap type wrench to remove the engine oil filter from the right side of the engine. Inspect the oil filter.
4. Clean the filter mounting base. Make sure that all of the used gasket has been completely removed.

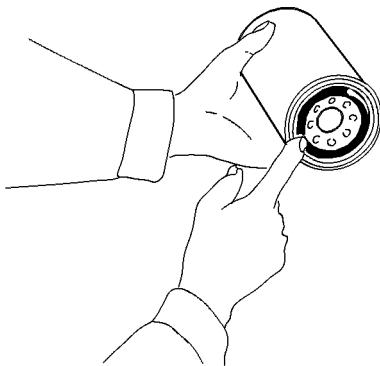


Illustration 214

g00101318

5. Apply a thin coat of oil to the seal on the new engine oil filter. Install a new engine oil filter hand tight until the seal of the engine oil filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the engine oil filter that are spaced 90 degrees or 1/4 or a turn away from each other. When you tighten the engine oil filter, use the rotation index marks as a guide.

6. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

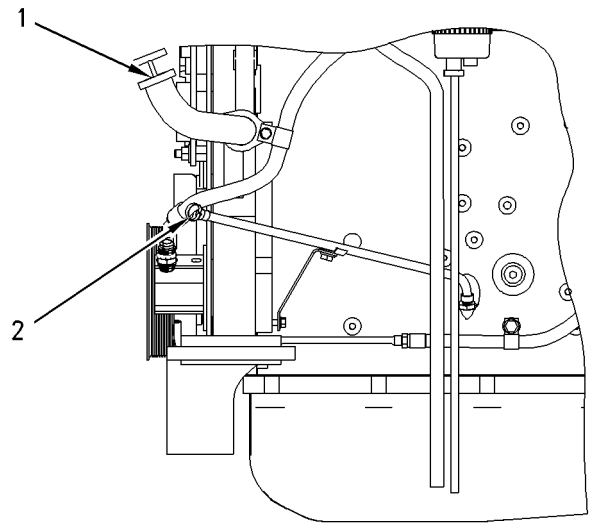


Illustration 215

g00806758

7. Remove oil filler cap (1) on the right side of the engine. Fill the crankcase with new oil.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the correct type of oil and for the correct amount of oil.

8. Clean the oil filler cap and install the oil filler cap.
9. Start the engine and allow the oil to warm. Check for any oil leaks.
10. Check the oil level on dipstick (2).

Reference: Refer to Operation and Maintenance Manual, "Engine Oil Level - Check" for the correct procedure.

11. Close the engine hood and stop the engine.

i04538255

Engine Valve Lash - Check

SMCS Code: 1105-535

In order to perform the valve lash adjustment, refer to Systems Operation, Testing and Adjusting, "Engine Valve Lash - Inspect/Adjust".

Note: A qualified mechanic should adjust the engine valve lash because special tools and training are required.

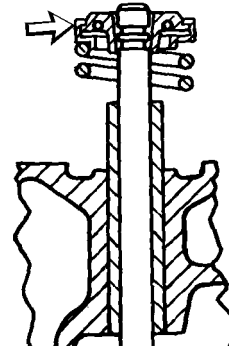


Illustration 217

g00038585

Engine Valve Rotators - Inspect

SMCS Code: 1109-040

WARNING

When inspecting the valve rotators, protective glasses or face shield and protective clothing must be worn, to prevent being burned by hot oil or spray.

WARNING

Electrical shock hazard. The electronic unit injector system uses 90-120 volts.

2. Watch the top surface of each valve rotator. Whenever an inlet valve closes or an exhaust valve closes, each valve rotator should turn.
3. If a valve rotator fails to rotate, consult your Caterpillar dealer for service.

Note: Caterpillar recommends replacing valve rotators that are operating improperly. An improperly operating valve rotator will shorten valve life because of accelerated wear on the valves.

Note: If a damaged valve rotator is not replaced, some valve face guttering could result. Metal particles from the valve could fall into the cylinder. This could cause damage to the piston head and to the cylinder head.

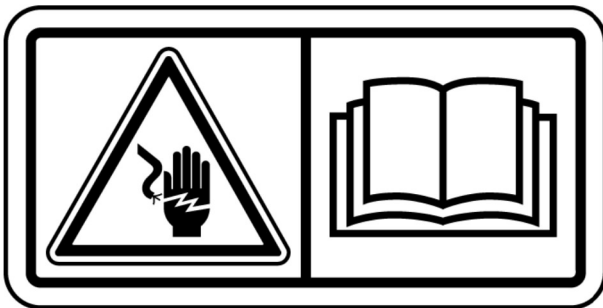


Illustration 216

g01372247

1. Start the engine. Run the engine at low idle.

i04844134

Ether Starting Aid Cylinder - Replace (If Equipped)

SMCS Code: 1456-510-CD

WARNING

Ether is poisonous and flammable.

Breathing ether vapors or repeated contact of ether with skin can cause personal injury.

Use ether only in well ventilated areas.

Do not smoke while changing ether cylinders.

Use ether with care to avoid fires.

Do not store replacement ether cylinders in living areas or in the operator's compartment.

Do not store ether cylinders in direct sunlight or at temperatures above 49 °C (120 °F).

Discard cylinders in a safe place. Do not puncture or burn cylinders.

Keep ether cylinders out of the reach of unauthorized personnel.

To avoid possible injury, be sure the brakes are applied and all controls are in Hold or Neutral when starting the engine.

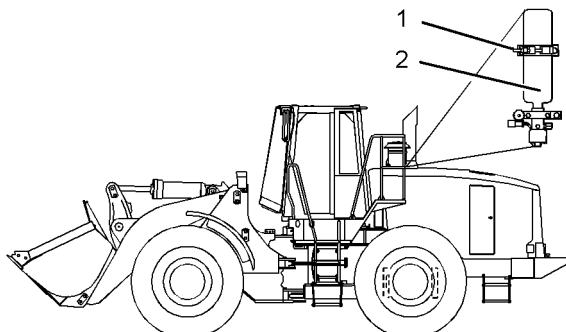


Illustration 218

g02976804

1. Open the access door. The ether starting aid cylinder is mounted on the left side of the machine next to the air cleaner.
2. Loosen retaining clamp (1) and unscrew ether starting aid cylinder (2).

3. Remove the gasket. Install the new gasket that is provided with each new ether starting aid cylinder.
4. Install new ether starting aid cylinder (2) hand tight. Tighten retaining clamp (1) securely.
5. Close the engine hood.

i01715517

Fuel System - Prime

SMCS Code: 1250-548

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

Note: The volume of the air in the water separator is small. Usually, it is not necessary to prime the fuel system if only the water separator element was changed.

i01715535

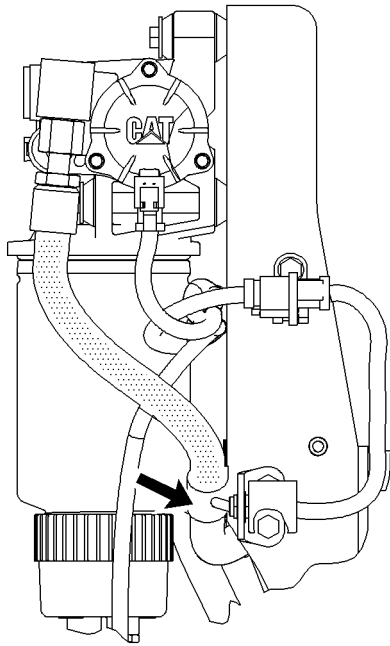


Illustration 219

g00882774

1. Stop the engine and open the engine hood. The fuel priming pump is located above the primary fuel filter on the right side of the machine. This machine is equipped with an electric fuel priming pump. The toggle switch for the pump is located on the filter base. Operate the fuel pump for approximately 60 seconds.

2. Start the engine.

Note: Additional priming may be needed if you are priming because of the following circumstances:

- The engine will not start.
- The engine starts but the engine continues to misfire.
- The engine starts but the engine continues to emit smoke.
- The engine has run out of fuel.
- The fuel injectors have been removed from the engine.

Operate an electric fuel pump for approximately 30 seconds for this additional priming.

Fuel System Primary Filter (Water Separator) - Drain

SMCS Code: 1263-543

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

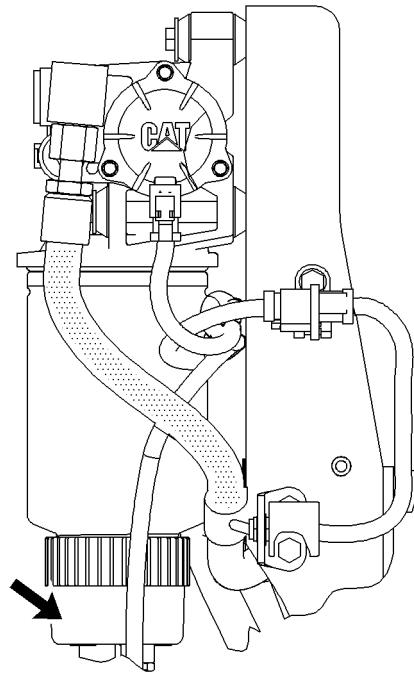


Illustration 220

g00882783

1. Open the engine hood. The water separator is located on the bottom of the primary fuel filter on the right side of the machine.
2. Open the drain valve on the bottom of the water separator bowl. Allow the water and the fuel to drain into a suitable container.
3. Close the drain valve.

Note: The water separator is under suction during normal engine operation. Tighten the drain valve securely in order to prevent air leakage into the fuel system.

4. Close the engine hood.

i02250381

Fuel System Primary Filter (Water Separator) Element - Replace

SMCS Code: 1260-510; 1263-510-FQ

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

NOTICE

Do not fill fuel filters with fuel before installing them. The fuel will not be filtered and could be contaminated. Contaminated fuel will cause accelerated wear to fuel system parts. The fuel system should be primed prior to starting the engine.

1. Open the engine hood. The primary fuel filter is located on the right side of the machine.

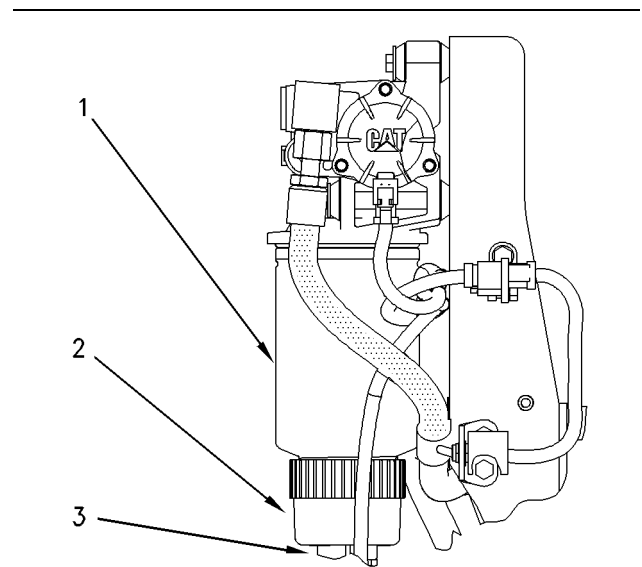


Illustration 221

g00806773

2. Open drain valve (3) on the bottom of water separator bowl (2). Allow the water and the fuel to drain into a suitable container.
 3. Use a strap type wrench in order to remove the primary fuel filter (1). Unscrew the sediment bowl from the fuel filter.
 4. Clean the water separator bowl and the O-ring groove.
- Note:** The water separator bowl is reusable. Do not discard the water separator bowl.
5. Inspect the O-ring seal on the water separator bowl. Replace the O-ring seal, if necessary.
 6. Lubricate the O-ring seal with clean diesel fuel or with engine oil. Place the O-ring seal in the water separator bowl.
 7. Install the water separator bowl onto the new filter element until the filter element is snug.
 8. Apply a thin coat of clean diesel fuel to the seal on the new filter. Install the new fuel filter hand tight until the seal of the fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

9. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

10. Close drain valve (1).

Note: The water separator element is under suction during normal engine operation. Tighten the drain valve securely in order to prevent air leakage into the fuel system.

11. Prime the fuel system in order to fill the water separator element with fuel.

Reference: Refer to Operation and Maintenance Manual, "Fuel System - Prime" for the correct procedure.

12. Close the engine hood.

4. Lubricate the seal of a new fuel filter with clean diesel fuel. Install the new fuel filter hand tight until the seal of the fuel filter contacts the base. Note the position of the index marks on the filter in relation to a fixed point on the filter base.

Note: There are rotation index marks on the fuel filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the fuel filter, use the rotation index marks as a guide.

5. Tighten the filter according to the instructions that are printed on the filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

NOTICE

Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.

6. Prime the fuel system.

Reference: Refer to Operation and Maintenance Manual, "Fuel System - Prime" for the correct procedure.

7. Close the engine hood.

Fuel System Secondary Filter - Replace

SMCS Code: 1261-510-SE

i02187930

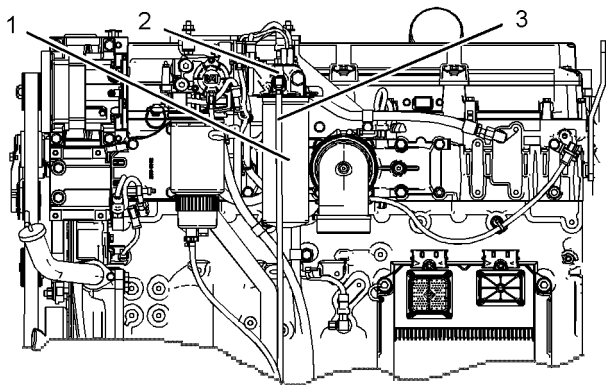


Illustration 222

g01106196

1. Open the hood. Secondary fuel filter (1) is located on the right side of the machine.
2. Open drain valve (2) in order to allow fuel to flow from the filter. The fuel will flow out of hose (3). Catch the fuel in a suitable container and dispose of the fuel properly. Close the drain valve. Remove the fuel filter. Dispose of the used filter properly.
3. Clean the filter mounting base. Make sure that all of the used gasket is removed.

i02877580

Fuel Tank Cap and Strainer - Clean

SMCS Code: 1273-070-Z2; 1273-070-STR

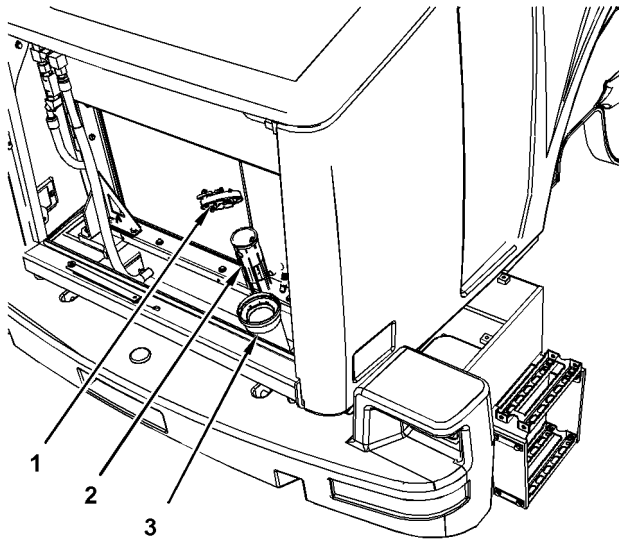


Illustration 223

g01432093

- (1) Cap
- (2) Strainer
- (3) Fuel Tank

Open the rear grill in order to access the fuel tank cap.

1. Remove the fuel tank cap.
2. Inspect the seal for damage. If the seal is damaged, replace the cap.
3. Remove the strainer from the filler tube.
4. Wash the fuel tank cap and the strainer in a clean, nonflammable solvent.
5. Install the strainer.

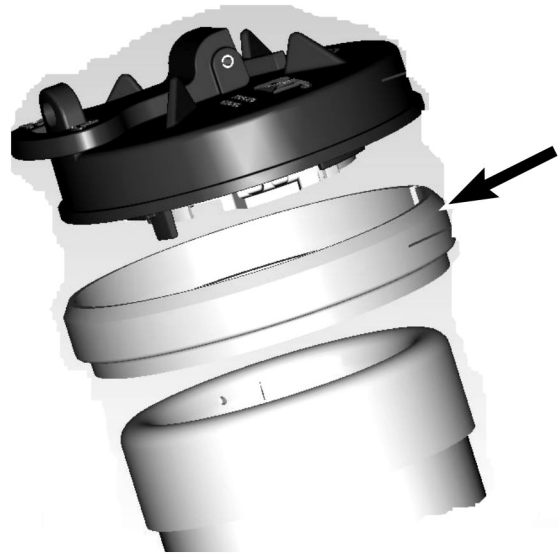


Illustration 224

g01431287

6. Inspect the fuel cap boot(if equipped). If the fuel cap boot is damaged, replace the fuel cap boot. If your machine does not have a fuel cap boot, contact your Caterpillar dealer for information about the fuel cap boot.
7. Wash the fuel cap boot in a clean, nonflammable solvent.
8. Install the fuel cap boot and the fuel tank cap.

i03657251

Fuel Tank Water and Sediment - Drain

SMCS Code: 1273-543-M&S

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

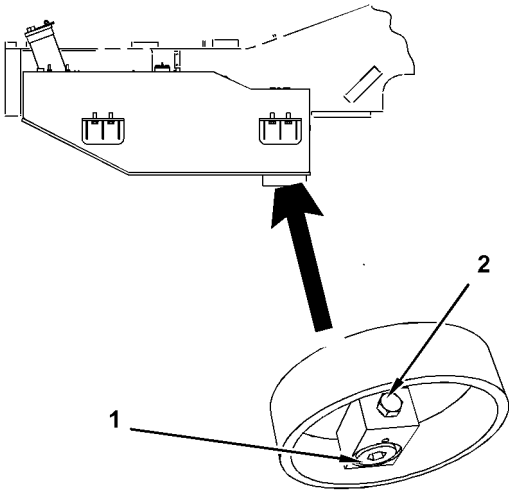


Illustration 225

g01962163

The drain valve is under the fuel tank at the rear of the machine.

1. Loosen the bolt (2) on the side of the drain.
2. Allow the water and the sediment to drain into a suitable container.
3. Tighten the bolt on the side of the drain.

i02200478

Fuses - Replace

SMCS Code: 1417-510

NOTICE

Replace fuses with the same type and size only. Otherwise, electrical damage can result.

If it is necessary to replace fuses frequently, an electrical problem may exist. Contact your Caterpillar dealer.



Fuses – The fuses protect the electrical system from a circuit that has been overloaded. Change a fuse if the element separates. If the element of a new fuse separates, check the circuit. Repair the circuit, if necessary.

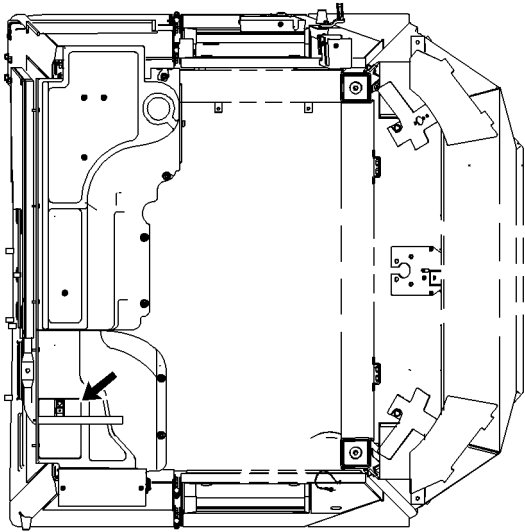


Illustration 226

g01000750

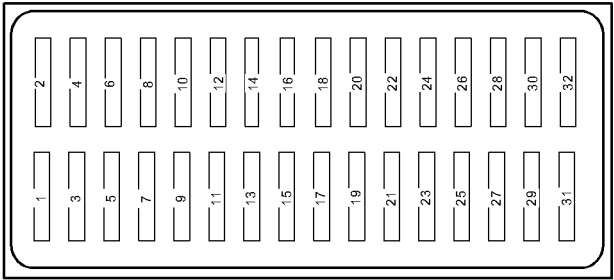


Illustration 227

g01078009

The fuses are located in the cab on the right side of the operator seat.

- | | |
|--------------------------------------|------------|
| (1) Axle Oil Cooler Clutch | 20 Amperes |
| (2) HMU Shift Handle | 10 Amperes |
| (3) HVAC Blower | 20 Amperes |
| (4) Quick Coupler | 10 Amperes |
| (5) Rear Cab Floodlights | 15 Amperes |
| (6) Spare | 10 Amperes |
| (7) Secondary Steering | 10 Amperes |
| (8) ECM Switched Power | 10 Amperes |
| (9) Front Cab Floodlights | 15 Amperes |
| (10) Beacon and Heated Mirrors | 10 Amperes |

i02245859

- (11) Turn Signal Flasher, Front Flood Relays, and Rear Flood Relays 10 Amperes
- (12) Machine Security System and Product Link 10 Amperes
- (13) LH Indicator Display and RH Indicator Display 10 Amperes
- (14) Tilt Position Sensor and Lift Position Sensor 10 Amperes
- (15) Lever Sensors and LH Brake Pedal Sensor 10 Amperes
- (16) Air Seat and Heated Seat 10 Amperes
- (17) EMS, Quad Gauge, Tachometer, and Backlights 10 Amperes
- (18) Wiper and Washer for the Front and the Rear Windows 10 Amperes
- (19) Payload Control System (PCS) 10 Amperes
- (20) Voltage Converter for Radio 10 Amperes
- (21) Voltage Converter Memory (Attachment) 10 Amperes
- (22) Engine ECM 15 Amperes
- (23) Transmission ECM 15 Amperes
- (24) Implement ECM 15 Amperes
- (25) ECAP and Center Dash Indicator Display 10 Amperes
- (26) LH Tail and Clearance Lights 10 Amperes
- (27) Hood Actuator 10 Amperes
- (28) Stop Lamps 10 Amperes
- (29) Horn 10 Amperes
- (30) Voltage Converter Memory (Standard) 10 Amperes
- (31) Key Start Switch and Product Link .. 10 Amperes
- (32) Dome Lamps 10 Amperes

High Intensity Discharge Lamp (HID) - Replace (If Equipped)

SMCS Code: 1434-510

WARNING

HID lamps operate at very high voltages. To avoid electrical shock and personal injury, disconnect power before servicing HID lamps.

WARNING

HID bulbs become very hot during operation. Before servicing, remove power from lamp for at least five minutes to ensure lamp is cool.

NOTICE

Although HID bulb materials may change over time, HID bulbs produced at the time of the printing of this manual contain mercury. When disposing of this component, or any waste that contains mercury, please use caution and comply with any applicable laws.

1. Remove the electrical power from the high intensity discharge lamp (HID). The electrical power must be removed from the HID lamp for at least five minutes, in order to ensure that the bulb is cool.
2. Disassemble the housing for the HID lamp in order to have access to the bulb.
- Note:** On some HID lamps, the bulb is an integral part of the lens assembly. The bulb is not removed separately from the lens assembly. Replace the entire lens assembly on these HID lamps.
3. Remove the bulb from the HID lamp.
4. Install the replacement bulb in the HID lamp.

If the bulb is an integral part of the lens assembly, install the replacement lens assembly in the HID lamp.

Note: In order to avoid failure to the bulb that is premature, avoid touching the bulb's surface with your bare hands. Clean any fingerprints from the bulb with alcohol prior to operation.

5. Reassemble the housing for the HID lamp. Ensure that any printing on the lens is oriented correctly with respect to the HID lamp's mounting position on the machine.

6. Reattach the electrical power to the HID lamp.
7. Check the HID lamp for proper operation.

Note: Consult your Caterpillar dealer for additional information on HID lamps.

i04546258

Hood Tilt Actuator - Lubricate

SMCS Code: 7275-086

Wipe all fittings before lubricating.

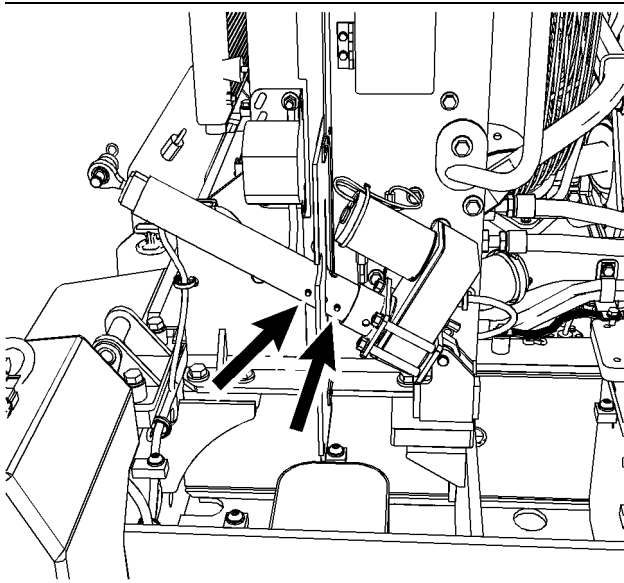


Illustration 228

g02148446

Hood tilt actuator (the hood is removed for clarity)

1. Fully raise the engine hood. The hood tilt actuator is located on the right side at the rear of the machine.
2. Fully extend the cylinder and wipe off the inner post with a clean cloth. Then, lubricate the entire length of the inner post.
3. Wipe off both fittings on the cylinder. Then, apply the lubricant through the two fittings until the lubricant escapes back through each fitting.
4. Fully close the engine hood.

i03657272

Hydraulic System Biodegradable Oil Filter Element - Replace (If Equipped)

SMCS Code: 5068-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

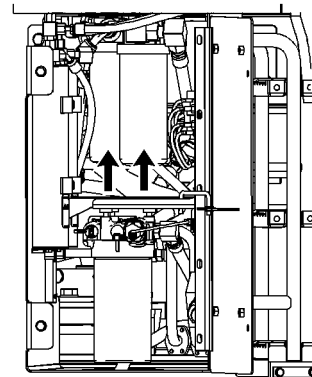


Illustration 229

g01108153

The hydraulic filters are located on the right side of the machine under the platform. There are two hydraulic oil filters. Each filter must be replaced during this procedure.

1. Use a strap type wrench to remove each filter element. Dispose of the used filter elements properly.
2. Clean the filter mounting bases. Make sure that all of the used seals are completely removed.

i03563580

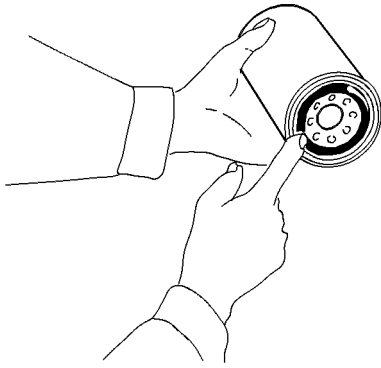


Illustration 230

g00101318

3. Apply a thin coat of hydraulic oil to the seals on the new filters. Install each new hydraulic oil filter hand tight until the seals of the hydraulic oil filters contact each filter base. Note the position of the index marks on each filter in relation to a fixed point on each filter base.

Note: There are rotation index marks on each hydraulic oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the hydraulic oil filters, use the rotation index marks as a guide.

4. Tighten each filter according to the instructions that are printed on each filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filter.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

5. Start the engine and run the engine at low idle. Inspect the hydraulic system for leaks.

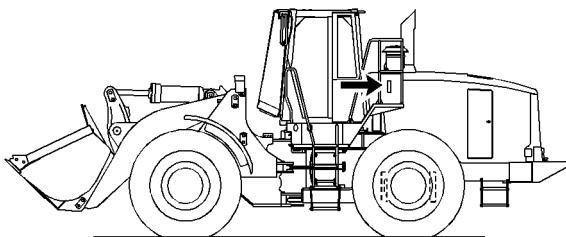


Illustration 231

g01185406

6. Maintain the oil level above the "ADD COLD" mark on the sight gauge. Add hydraulic oil, if necessary.

Hydraulic System Oil - Change

SMCS Code: 5056-044

Selection of the Oil Change Interval

Your machine may be able to use a 4000 hour interval for the hydraulic oil. The hydraulic oil is in the system that is not integral to the service brakes, the clutches, the final drives, or the differentials. The standard change interval is 2000 hours. The oil should be monitored during intervals of 500 hours. The extended 4000 hour interval can be used if the following criteria are met.

HYDO Advanced 10

Cat HYDO Advanced 10 is the preferred oil for use in most Caterpillar machine hydraulic and hydrostatic transmission systems when ambient temperature is between -20°C (-4°F) and 40°C (104°F). Cat HYDO Advanced 10 has an SAE viscosity grade of 10W. **Cat HYDO Advanced 10 has a 50% increase in the standard oil drain interval** (up to 3000 hours) for machine hydraulic systems over second and third choice oils when you follow the maintenance interval schedule for oil filter changes and for oil sampling that is stated in the Operation and Maintenance Manual. 6000 hour oil drain intervals are possible when using S-O-S Services oil analysis. When you switch to Cat HYDO Advanced 10, cross contamination with the previous oil should be kept to less than 10%. Consult your Cat dealer for details about the benefits from the improved performance designed into Cat HYDO Advanced 10.

Oil Filters

Caterpillar oil filters are recommended. The interval for changing the oil filter should be 500 hours.

Oil

The 6000 hour interval for changing the oil is specific to HYDO Advanced 10.

The 4000 hour interval for changing the oil is for the following oil types.

- Caterpillar Hydraulic Oil (HYDO)
- Caterpillar Transmission and Drive Train Oil (TDTO)
- Caterpillar TDTO-TMS
- Caterpillar Diesel Engine Oil

- Caterpillar Biodegradable Hydraulic Oils (HEES)
- Caterpillar Multipurpose Tractor Oil (MTO)
- Heavy-duty diesel engine oils with a minimum zinc content of 900 ppm

If Caterpillar oils cannot be used, use heavy-duty oils with the following classification: Caterpillar ECF-1, API CG-4, API CF, and TO-4. These oils must have a minimum zinc additive of 0.09 percent (900 ppm).

Note: Industrial hydraulic oils are not recommended in Caterpillar hydraulic systems.

Monitoring the Condition of the Oil

The oil should be monitored during intervals of 500 hours. Caterpillar's standard SOS Fluids Analysis or an equivalent oil sampling program should be used.

The current guidelines for cleanliness of the oil should be observed. Refer to "Measured Data".

If an oil sampling program is not available, the standard 2000 oil change interval should be used.

Measured Data

The following information should be monitored through sampling of the oil:

- Significant changes in wear metals should be monitored. These metals include iron, copper, chromium, lead, aluminum, and tin.
- Significant changes in the following additives should be monitored: zinc, calcium, magnesium, and phosphorus.
- Contaminants should not be present. These contaminants include fuel and antifreeze. Water content should be .5 percent or less.
- The silicon level should not exceed 15 parts per million for new oil. The particle counts should be monitored.
- The recommended level of cleanliness for Caterpillar machines that are operated in the field is ISO 18/15 or cleaner. The cleanliness should be monitored by particle count analysis. The levels of contamination should not exceed the normal by more than two ISO codes. Action should be taken in order to determine the cause of the contamination. The system should be returned to the original levels of contamination.
- There should not be significant changes in sodium, silicon, copper, and potassium.

- The allowable level of oxidation is 40 percent (0.12 Abs units).
- The kinematic viscosity of 100 °C (212 °F) oil should not exceed a change of more than 2 cSt from new oil.

Procedure for Changing the Hydraulic Oil

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine in order to warm the hydraulic oil.
2. Park the machine on level ground. Lower the attachment to the ground and apply slight downward pressure. Engage the parking brake and stop the engine.

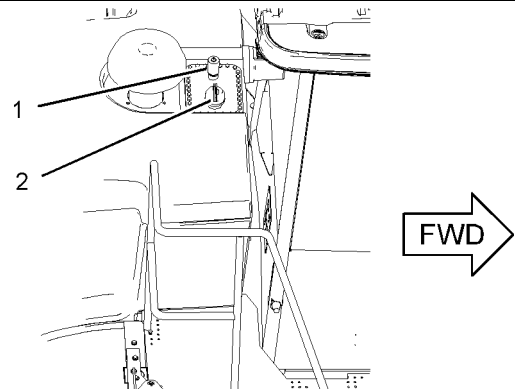


Illustration 232

g01185530

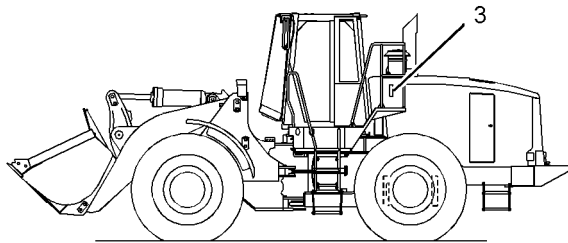


Illustration 233

g01185539

3. The hydraulic tank is behind the cab of the machine. Press the button on breaker relief valve (1) in order to relieve any tank pressure.
4. Remove hydraulic tank filler cap (2) and the filler strainer. The filler strainer is located right beneath the hydraulic tank filler cap. Wash the filler cap and the strainer in a clean, nonflammable solvent. Install the strainer.
5. Inspect the gasket on the hydraulic tank filler cap for damage. Replace the gasket, if necessary.

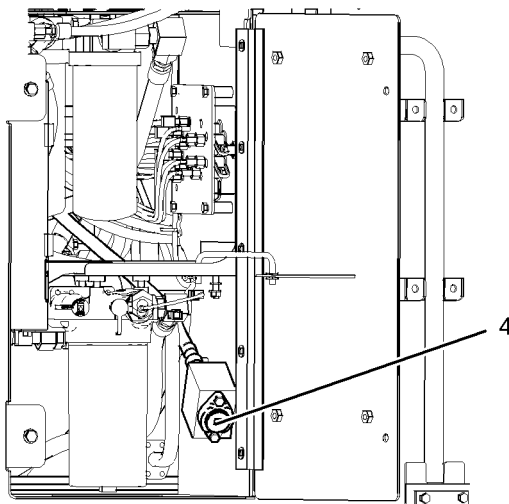


Illustration 234

g01108775

6. The hydraulic tank has a remote drain plug which is located on the right side of the machine under the platform. Remove drain plug (4). Wash the drain plug in a clean, nonflammable solvent.
7. The hydraulic tank is equipped with an ecology drain valve. Attach a hose to a suitable drain adapter. Install the adapter in the drain valve and allow the oil to drain into a suitable container.

8. After you have drained the oil, remove the adapter from the drain opening.

NOTICE

Never start the engine while the hydraulic oil tank is being drained or while the hydraulic oil tank is empty. Excessive wear and damage to the hydraulic components can occur.

9. Close the drain valve. Install the drain plug.
10. Change the hydraulic oil filter.

Reference: Refer to Operation and Maintenance Manual, "Hydraulic System Oil Filter - Replace" for the correct procedure.

11. Fill the hydraulic tank with clean oil. Make sure that the oil level is at the "FULL" mark on sight gauge (3). Install the filler cap.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the correct type of oil and for the correct amount of oil.

12. Start the engine and run the engine for at least ten seconds. Then, stop the engine and add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.
13. Start the engine and run the engine at low idle. Cycle the implements so that all hydraulic systems are filled with oil.

Note: If the alert indicator for a low oil level comes on, stop the engine and immediately add oil to the hydraulic tank. The oil level should not be below the suction ports in the hydraulic tank while the engine is running.

14. Add hydraulic oil to the tank until the oil level is at the "FULL" mark on the sight gauge.
15. Stop the engine. Top off the hydraulic tank so that the oil level is at the "FULL" mark on the sight gauge. Install the filler cap.

Note: The oil must be free of air bubbles. If air bubbles are present in the hydraulic oil, air is entering the hydraulic system. Inspect the hydraulic suction line and the hose clamps.

16. If necessary, tighten any loose clamps or any loose connections. Replace any damaged hoses.

i02375329

Hydraulic System Oil Filter - Replace

SMCS Code: 5068-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

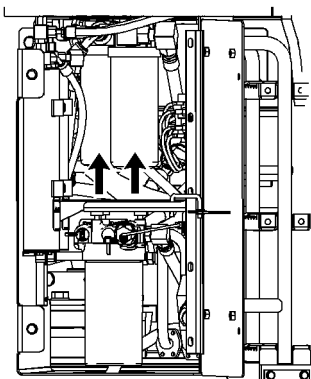


Illustration 235

g01108153

The hydraulic filters are located on the right side of the machine under the platform. There are two hydraulic oil filters. Each filter must be replaced during this procedure.

1. Use a strap type wrench to remove each filter element. Dispose of the used filter elements properly.
2. Clean the filter mounting bases. Make sure that all of the used seals are completely removed.

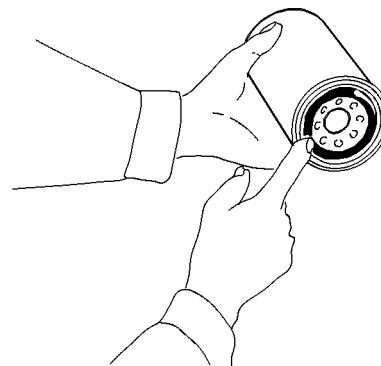


Illustration 236

g00101318

3. Apply a thin coat of hydraulic oil to the seals on the new filters. Install each new hydraulic oil filter hand tight until the seals of the hydraulic oil filters contact each filter base. Note the position of the index marks on each filter in relation to a fixed point on each filter base.

Note: There are rotation index marks on each hydraulic oil filter that are spaced 90 degrees or 1/4 of a turn away from each other. When you tighten the hydraulic oil filters, use the rotation index marks as a guide.

4. Tighten each filter according to the instructions that are printed on each filter. Use the index marks as a guide. For non-Caterpillar filters, use the instructions that are provided with the filters.

Note: You may need to use a Caterpillar strap wrench, or another suitable tool, in order to turn the filter to the amount that is required for final installation. Make sure that the installation tool does not damage the filter.

5. Start the engine and run the engine at low idle. Inspect the hydraulic system for leaks.

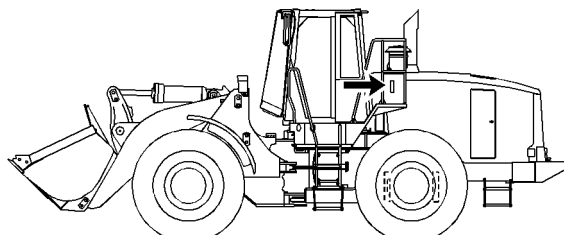


Illustration 237

g01185406

6. The oil gauge and the hydraulic oil filler are on the left side of the machine above the platform. Maintain the oil level above the "ADD COLD" mark on the sight gauge. Add hydraulic oil, if necessary.

i02375341

Hydraulic System Oil Level - Check

SMCS Code: 5056-535-FLV

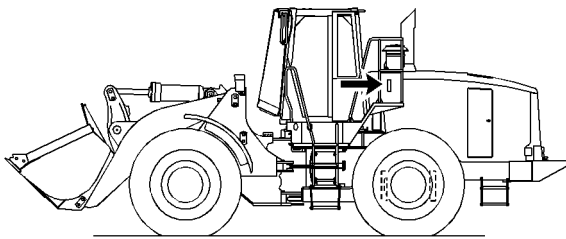


Illustration 238

g01185406

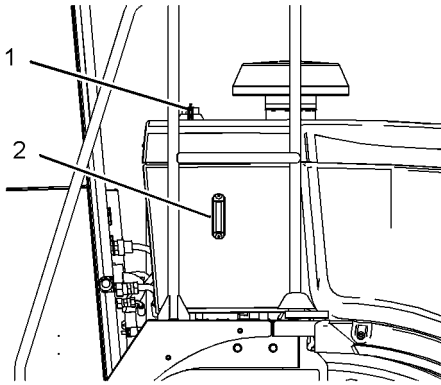


Illustration 239

g01185435

The hydraulic tank is located on the left side of the machine behind the cab.

The lift arms must be lowered with the bucket flat in order to check the hydraulic oil. Check the hydraulic oil level while the engine is stopped. Maintain the oil level above the "ADD COLD" mark on sight gauge (2). If necessary, remove filler cap (1) slowly and add oil.

i02375351

Hydraulic System Oil Sample - Obtain

SMCS Code: 5050-008; 5056-008; 7542

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Dealer Service Tool Catalog" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. Operate the hydraulic controls. This will thoroughly mix the hydraulic oil for a more accurate sample.

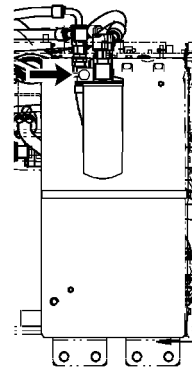


Illustration 240

g01185445

2. If the machine is equipped with conventional oil, open the access door to the service center on the right side of the machine. The hydraulic oil filter is above the shelf. The sampling valve for the hydraulic oil is located on the hydraulic oil filter base.
3. If the machine is equipped with biodegradable hydraulic oil, open the access door to the service center on the right side of the machine. The hydraulic oil filter is above the shelf. The sampling valve for the hydraulic oil is located on the hydraulic oil filter base.
4. Use the in-line sampling valve in order to obtain a sample of hydraulic oil.

5. Close the access door to the service center on the right side of the machine.

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S-O-S Oil Analysis" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i02375419

Hydraulic Tank Breaker Relief Valve - Clean

SMCS Code: 5118-070

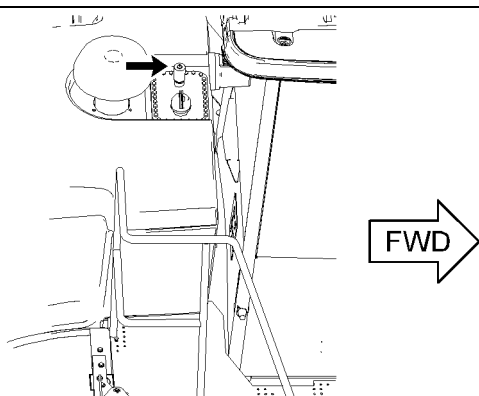


Illustration 241

g01185542

The hydraulic tank breaker relief valve is located on the top of the hydraulic tank behind the cab of the machine.

1. Press the button on the top of the hydraulic breaker in order to relieve the pressure in the hydraulic tank. Remove the hydraulic tank breaker relief valve.
2. Clean the hydraulic tank breaker relief valve in a clean, nonflammable solvent. Shake the breaker relief valve dry or use pressure air to dry the breaker relief valve.
3. Install the hydraulic tank breaker relief valve.

i03657276

Logging Fork Clamp - Lubricate (If Equipped)

SMCS Code: 6113-086-BD; 6410-086-BD

Wipe off all fittings before any lubricant is applied.

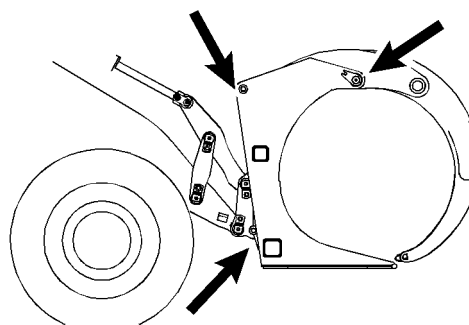


Illustration 242

g01962679

Apply lubricant through three fittings on each side of the logging fork.

There is a total of six fittings.

i02106227

Oil Filter - Inspect

SMCS Code: 1308-507; 3004-507; 3067-507; 5068-507

Inspect a Used Filter for Debris

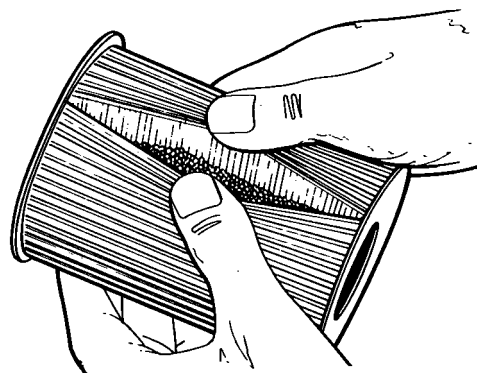


Illustration 243

g00100013

The element is shown with debris.

Use a filter cutter to cut the filter element open. Spread apart the pleats and inspect the element for metal and for other debris. An excessive amount of debris in the filter element can indicate a possible failure.

If metals are found in the filter element, a magnet can be used to differentiate between ferrous metals and nonferrous metals.

Ferrous metals can indicate wear on steel parts and on cast iron parts.

Nonferrous metals can indicate wear on the aluminum parts of the engine such as main bearings, rod bearings, or turbocharger bearings.

Small amounts of debris may be found in the filter element. This could be caused by friction and by normal wear. Consult your Caterpillar dealer in order to arrange for further analysis if an excessive amount of debris is found.

Using an oil filter element that is not recommended by Caterpillar can result in severe engine damage to engine bearings, to the crankshaft, and to other parts. This can result in larger particles in unfiltered oil. The particles could enter the lubricating system and the particles could cause damage.

i04004068

Pallet Fork - Inspect

SMCS Code: 6136-040

Descriptions of the Fork Tine

Parts

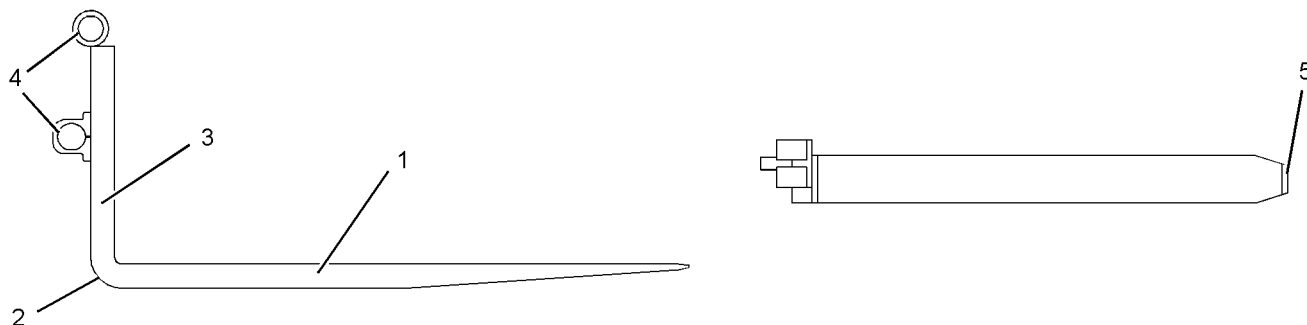


Illustration 244

g01598401

(1) Blade – The horizontal part of the fork tine that supports the load

(2) Heel – The radius on the fork tine that connects the blade to the shank

(3) Shank – The vertical part of the fork tine that has the hooks that support the fork tines attached.

(4) Hook or Hanger – Carriers that mount the fork tines to the carriage

(5) Tip – The free end of the blade

Surfaces

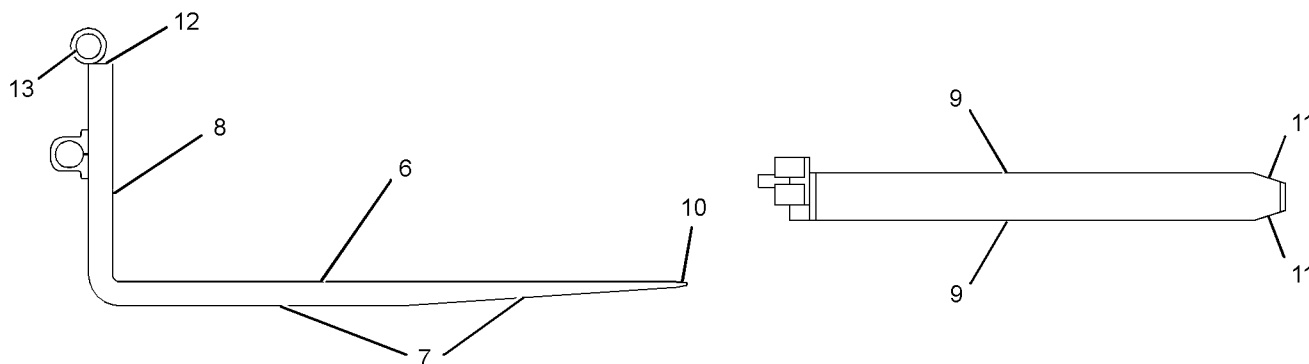


Illustration 245

g01598403

(6) Upper Face of the Blade – The upper surface of the blade that carries the load

(7) Bottom of Heel – The lower surface of the blade that includes the tapers

(8) Front Face of Shank – The distance for the load center is measured from the front face of the shank and the face of the shank contacts the load.

(9) Flanks – The side faces of the blade and the shank.

(10) Blade Bevel – The upper and lower surfaces of the tip on the blade that are tapered for easy insertion of the fork tines

(11) Tip Flanks – The side surfaces of the tip on the blade that are tapered for easy insertion of the fork tines

(12) Top of Shank – The upper surface on the shank

(13) Shaft – The tubes that are mounted on the fork tines for mounting the fork tines to the carriage

Dimensions

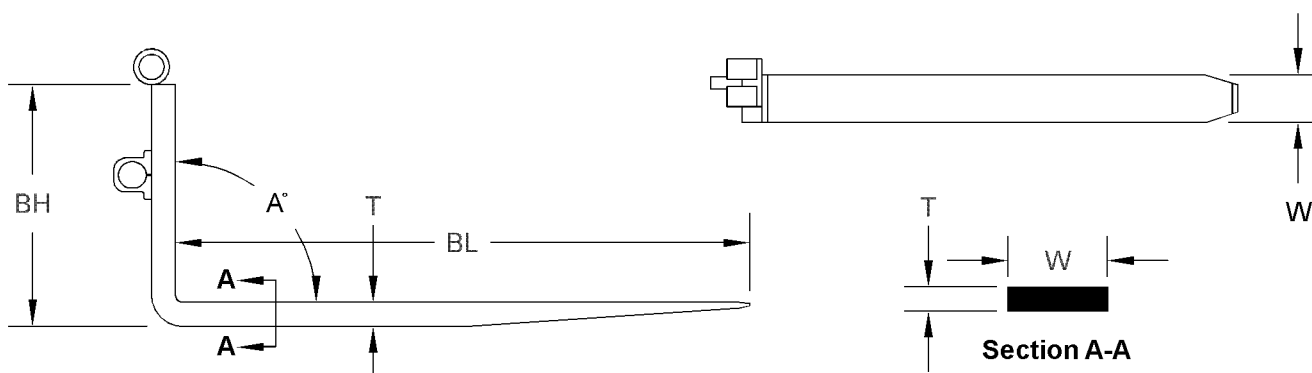


Illustration 246

g01598405

(T) Thickness – The thickness of the blade at the closest point to the heel

(W) Width – The width of the blade at the closest point to the heel

(BH) Back Height – The distance from the bottom of the blade to the top of the shank

(BL) Length – The length of the blade is measured from the front face on the shank to the tip on the blade.

(A) Angle – The angle from the upper surface of the blade to the front face of the shank.

Inspection of the Fork Tines

Check the fork tines daily for any twisting or bending of the fork tines. If any twisting or bending is observed, the fork tines should be changed prior to any lifting operation. If the fork tines are damaged, consult your Cat dealer.

Check the fork tines for wear or for damage. Inspect the welds, the locks, the shafts, and the fork tines for damage. If the components are damaged, consult your Cat dealer. Refer to , "Daily Inspection" for additional information.

Blade Thickness

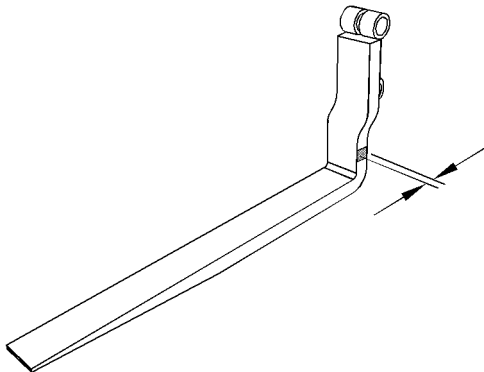


Illustration 247

g01600073

1. Measure the thickness of the shank. Ensure that the measuring device is held square across the shank in order to acquire an accurate measurement.

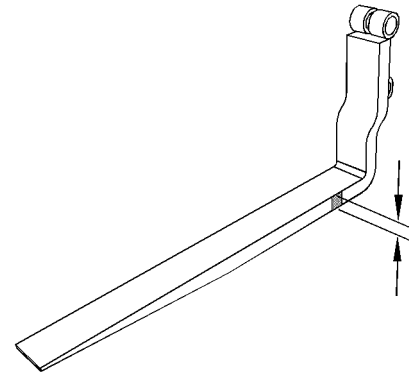


Illustration 248

g01600074

2. Measure the blade of the fork tine near the heel. Ensure that the measuring device is held square across the blade in order to acquire an accurate measurement.
3. Compare the measurement of the blade and the measurement of the shank.
4. If the difference in measurements is less than 10%, the fork tine can remain in service.
5. If the difference in measurements is greater than 10%, the fork tine must be taken out of service. Fork tine wear that is greater than 10%, represents a 20% reduction in the capacity of the fork tine.

Consult your Cat dealer for additional information.

Angle of the Heel

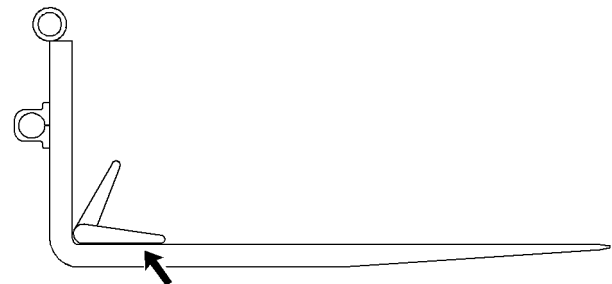


Illustration 249

g01600075

1. Place a measuring device in the top inside area of the heel on top of the blade. Ensure that the measuring device is held flat against the blade in order to acquire an accurate measurement.

i03082842

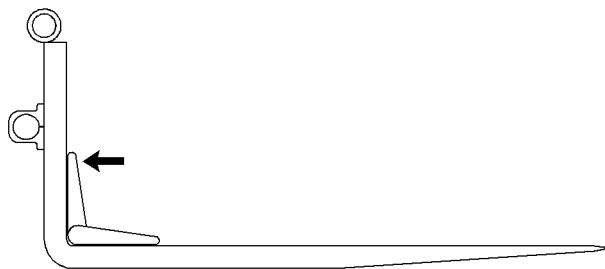


Illustration 250

g01600076

2. Move the upper arm of the measuring device toward the face of the shank. Ensure that the measuring device is held flat against the face of the shank in order to acquire an accurate measurement.
3. Check the angle that was measured with the device for the angle of the heel.
4. If the angle is between 87 degrees and 93 degrees, the fork tine can remain in service.
5. If the angle is less than 87 degrees or greater than 93 degrees, the fork tine must be taken out of service. The fork tines must be inspected for the following conditions:
 - permanent deformation
 - stress cracks
 - other defects

Consult your Cat dealer for additional information.

Pallet Fork - Lubricate

SMCS Code: 6136-086

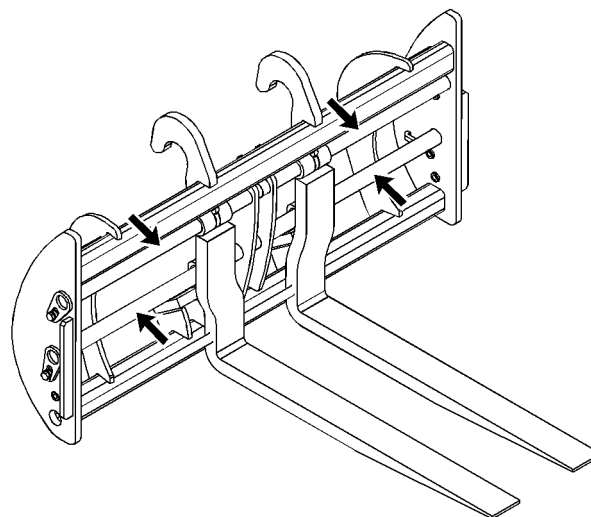


Illustration 251

g01563105

typical example

1. Coat the shafts with grease.

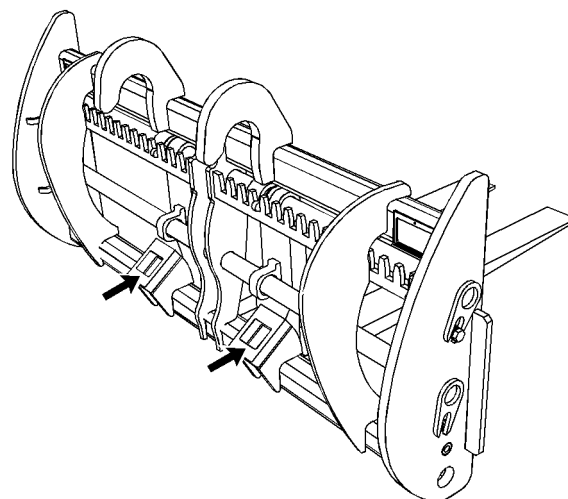


Illustration 252

g01563115

typical example

2. Coat the mounting holes for the quick coupler with grease.

Reference: Refer to Operation and Maintenance Manual, SEBU6250, "Caterpillar Machine Lubricant Recommendations" for information on lubricants.

i03657277

Quick Coupler - Check (If Equipped)

SMCS Code: 6129-535

When you install a work tool on the quick coupler, inspect the engagement of the coupler pins. If there is play between the coupler pins and the corresponding bores, inspect the coupler pins and the bores for damage or wear.

If there is play between the quick coupler and the hooks of the work tool, inspect the quick coupler and the hooks for wear or for damage.

Make any necessary repairs before you operate the work tool.

i03657285

Quick Coupler - Lubricate (If Equipped)

SMCS Code: 6129-086

Note: Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for more information on the types of grease to use. Refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations" for more information on grease.

Wipe off all lubricant fittings before you apply lubricant through the lubricant fittings.

Do not lubricate the wedge and the wear plates. Friction is needed in order to hold the wedge in place during backfilling.

i04039311

Radiator Core - Clean

SMCS Code: 1353-070-KO

Ensure that the engine is off before you perform this procedure.

1. Open the radiator grill at the rear of the machine.

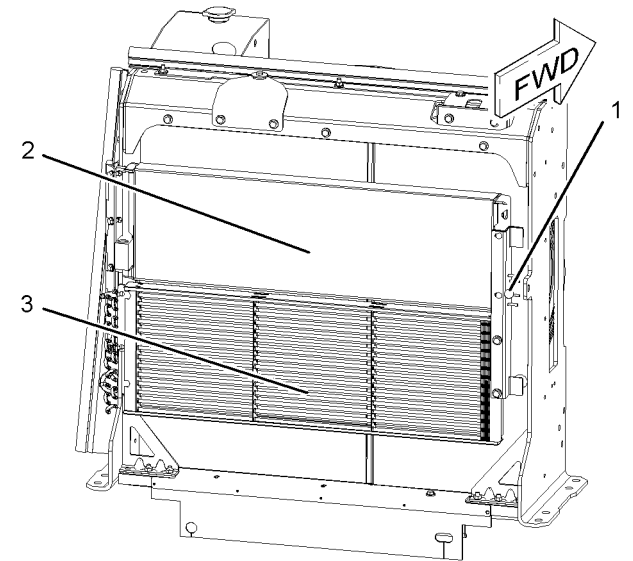


Illustration 253

g01107157

2. Use the control knob (1) in order to release the hydraulic oil cooler. Swing hydraulic oil cooler (2) and condenser (3) away from the radiator.

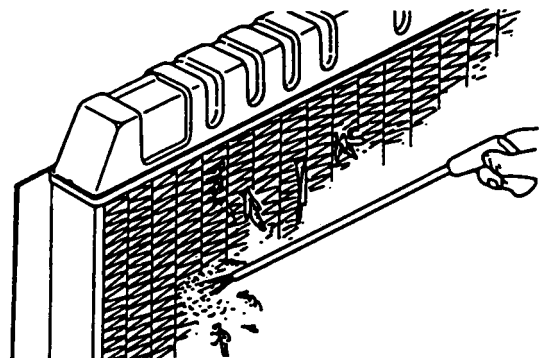


Illustration 254

g00101939

3. You can use compressed air, high-pressure water, or steam to remove dust and other debris from the radiator fins. The maximum air pressure for cleaning purposes must be reduced to 205 kPa (30 psi). The maximum water pressure for cleaning purposes must be below 275 kPa (40 psi). However, the use of compressed air is preferred. Refer to Operation and Maintenance Manual, "General Hazard Information" for Safety information about using pressurized air and water.
4. Swing the hydraulic oil cooler and the air conditioner condenser (if equipped) back into the operating position.
5. Close the radiator grill.

i02894326

Receiver Dryer (Refrigerant) - Replace

SMCS Code: 7322-510

WARNING

Personal injury can result from contact with refrigerant.

Contact with refrigerant can cause frost bite. Keep face and hands away to help prevent injury.

Protective goggles must always be worn when refrigerant lines are opened, even if the gauges indicate the system is empty of refrigerant.

Always use precaution when a fitting is removed. Slowly loosen the fitting. If the system is still under pressure, release it slowly in a well ventilated area.

Personal injury or death can result from inhaling refrigerant through a lit cigarette.

Inhaling air conditioner refrigerant gas through a lit cigarette or other smoking method or inhaling fumes released from a flame contacting air conditioner refrigerant gas, can cause bodily harm or death.

Do not smoke when servicing air conditioners or wherever refrigerant gas may be present.

Use a certified recovery and recycling cart to properly remove the refrigerant from the air conditioning system.

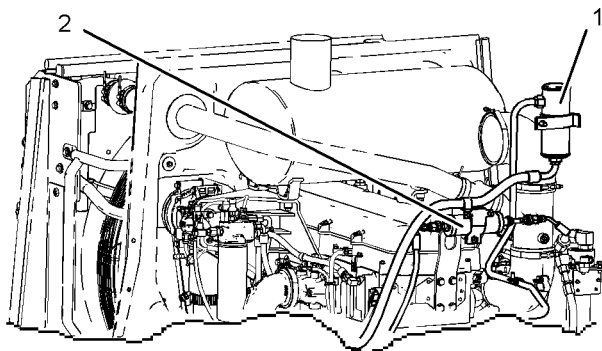


Illustration 255

g01107270

- (1) Refrigerant accumulator
(2) Refrigerant dryer

Access refrigerant accumulator (1) from the left side of the machine. Access in-line refrigerant dryer (2) from the right side of the machine.

Refer to Service Manual, SENR5664, "Refrigerant Accumulator - Remove and Install" for the replacement procedure of accumulator (1).

Refer to Service Manual, SENR5664, "In-Line Refrigerant Dryer - Remove and Install" for the replacement procedure of refrigerant dryer (2).

Note: When you operate the machine in a climate with high humidity, replace the in-line refrigerant dryer after every 1000 service hours or 6 months.

i02747279

Ride Control Accumulator - Check

SMCS Code: 5077-535-R6

Note: When the ride control accumulator is properly charged, the bouncing motion of the machine is reduced by the ride control accumulator.

1. Put a typical load in the bucket.
2. Press the bottom of the ride control switch in order to activate the ride control function.
3. Drive the machine over a rough road surface.

If the machine bounces too much or the accumulator piston striking the stop can be heard, consult your Caterpillar dealer or refer to Service Manual Testing and Adjusting, "Ride Control Accumulator - Test and Charge".

i03657286

Roading Fender Hinges - Lubricate (If Equipped)

SMCS Code: 7252-086-RNG

Wipe off the fitting before any lubricant is applied.

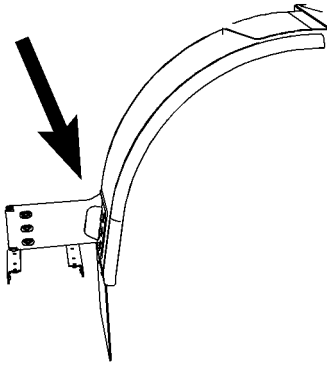


Illustration 256

g01963400

Open the roading fender. Apply lubricant through one fitting on the hinge. There is one hinge on each side of the machine.

i01457460

Rollover Protective Structure (ROPS) - Inspect

SMCS Code: 7323-040; 7325-040

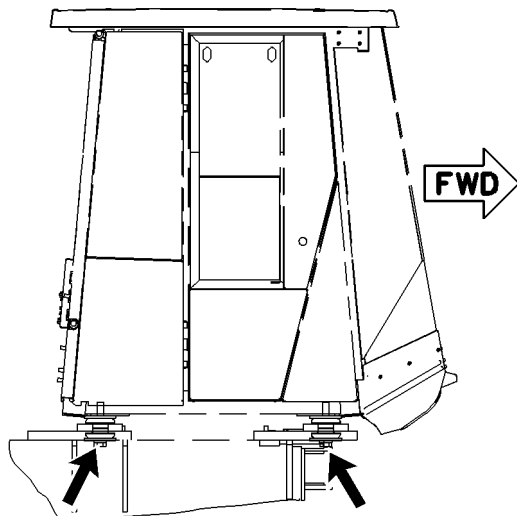


Illustration 257

g00762107

Inspect the ROPS for bolts that are loose or damaged. Use original equipment parts only to replace bolts that are damaged or missing. Tighten the four cab mounting bolts to a torque of 850 ± 100 N·m (629 ± 74 lb ft).

Note: Apply oil to all bolt threads before installation. Failure to apply oil can result in improper bolt torque.

Do not repair the ROPS by welding reinforcement plates to the ROPS. Consult your Caterpillar dealer for repair of cracks in any welds, in any castings, or in any metal section of the ROPS.

i04423622

Seat Belt - Inspect

SMCS Code: 7327-040

Always inspect the condition of the seat belt and the condition of the seat belt mounting hardware before you operate the machine. Replace any parts that are damaged or worn before you operate the machine.

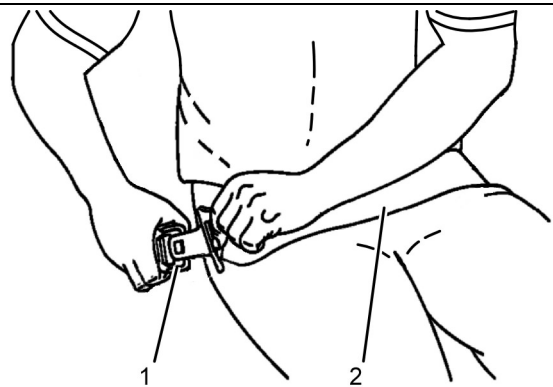


Illustration 258

g02620101

Typical example

Inspect buckle (1) for wear or for damage. If the buckle is worn or damaged, replace the seat belt.

Inspect seat belt (2) for webbing that is worn or frayed. Replace the seat belt if the webbing is worn or frayed.

Inspect all seat belt mounting hardware for wear or for damage. Replace any mounting hardware that is worn or damaged. Make sure that the mounting bolts are tight.

If your machine is equipped with a seat belt extension, also perform this inspection procedure for the seat belt extension.

Contact your Cat dealer for the replacement of the seat belt and the mounting hardware.

Note: The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

i04421974

i03694709

Seat Belt - Replace

SMCS Code: 7327-510

The seat belt should be replaced within 3 years of the date of installation. A date of installation label is attached to the seat belt retractor and buckle. If the date of installation label is missing, replace belt within 3 years from the year of manufacture as indicated on belt webbing label, buckle housing, or installation tags (non-retractable belts).

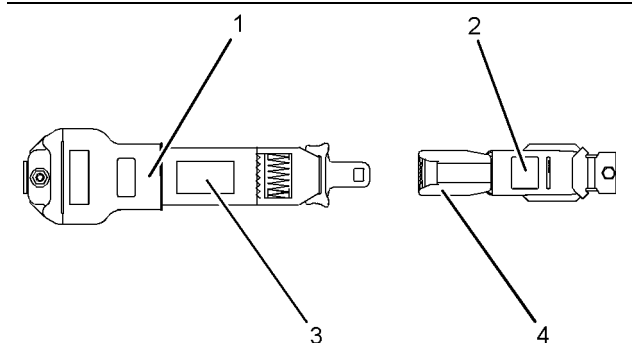


Illustration 259

g01152685

Typical Example

- (1) Date of installation (retractor)
- (2) Date of installation (buckle)
- (3) Year of manufacture (tag) (fully extended Web)
- (4) Year of manufacture (underside) (buckle)

Consult your Cat dealer for the replacement of the seat belt and the mounting hardware.

Determine age of new seat belt before installing on seat. A manufacture label is on belt webbing and imprinted on belt buckle. Do not exceed install by date on label.

Complete seat belt system should be installed with new mounting hardware.

Date of installation labels should be marked and affixed to the seat belt retractor and buckle.

Note: Date of installation labels should be permanently marked by punch (retractable belt) or stamp (non-retractable belt).

If your machine is equipped with a seat belt extension, also perform this replacement procedure for the seat belt extension.

Secondary Steering - Test

SMCS Code: 4300-081-SE; 4300-081-SST;
4324-081; 4324

WARNING

The service brake must be checked in order to ensure proper operation before you test the supplemental steering system.

Personal injury, death, or property damage could occur if the supplemental steering system is tested and the service brake is not operational.

Test the service brake before you test the supplemental steering system.

Perform the following procedure if your machine is equipped with a ground driven supplemental steering and if the procedure is required by local regulations.

Ensure that there are no hazards in the test area. The test area must be unobstructed and level. Operate the machine in second gear.

Ensure that all air tanks and accumulators are properly charged. Ensure that there is no load in the work tool. Position the machine with the bucket or the work tool in the carry position with the machine in neutral. Release the parking brake. Apply the service brakes and put the engine at low idle. Ensure that The area around the machine is clear of personnel. Shift the transmission to second gear forward and slowly release the service brakes. Moderately increase the engine speed to high idle. Shift the transmission to neutral. Turn the ignition to the OFF position. Allow the machine to coast.

While the machine is in motion, turn the machine to the left and to the right. If the machine responds to the steering input, the supplemental steering system is operating. Stop the machine with the service brakes. Apply the parking brake. The machine can then be returned to normal operation.

If there is no response to the steering input, the supplemental steering system is not operating. Stop the machine immediately. Repair the supplemental steering system before returning the machine to service.

i02197967

Service Brake Wear Indicator - Check

SMCS Code: 4255-535-IND

Reference: For information about checking the service brake wear indicator, refer to Testing and Adjusting, "Braking System" for the machine that is being serviced or consult your Caterpillar dealer.

i02837395

Steering Column Play - Check

SMCS Code: 4310-535; 4338-535

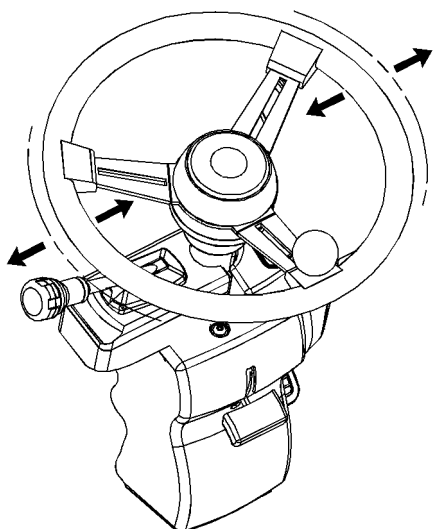


Illustration 260

g01411297

1. Hold the steering wheel with both hands.
2. Try to move the steering wheel from one side to the other side. The maximum allowed movement in the steering column should not exceed 25 mm (1.0 inch). If this movement exceeds this value please contact your Caterpillar dealer for the required service.

i02585698

Steering Column Spline (Command Control Steering) - Lubricate

SMCS Code: 4310-086-SN; 4338-086-SN

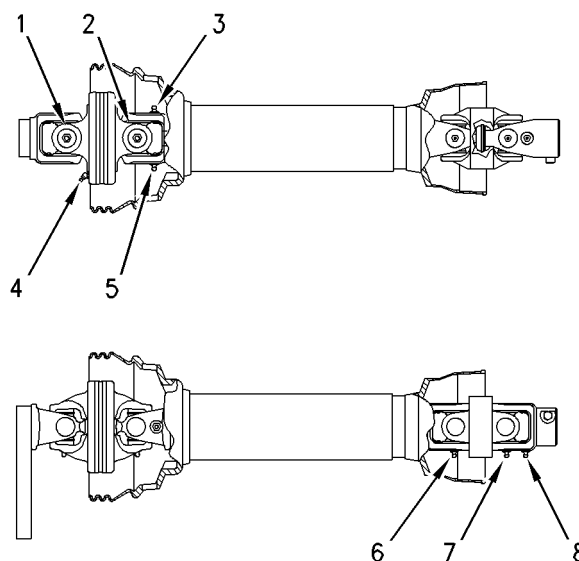


Illustration 261

g00812993

1. Remove the steering shaft from the machine.

Reference: Refer to Disassembly and Assembly Manual for the removal procedure and for the installation procedure.

2. Wipe off all of the fittings before any lubricant is applied.
3. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for the proper grease to use. Apply the grease through fittings (1), (2), (3), (4), (5), (6), (7), and (8).
4. Install the steering shaft on the machine.

i03657300

Steering Column Spline (HMU Steering) - Lubricate

SMCS Code: 4310-086-SN; 4338-086-SN

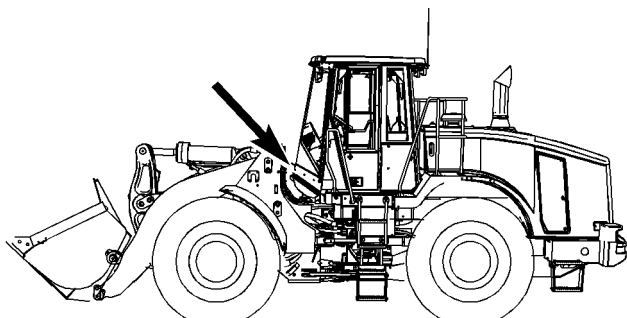


Illustration 262

g01962195

The metering pump is located under the cab.

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

Note: Do not disconnect any hydraulic lines from the metering pump.

Use the following steps to lubricate the splines on the steering column:

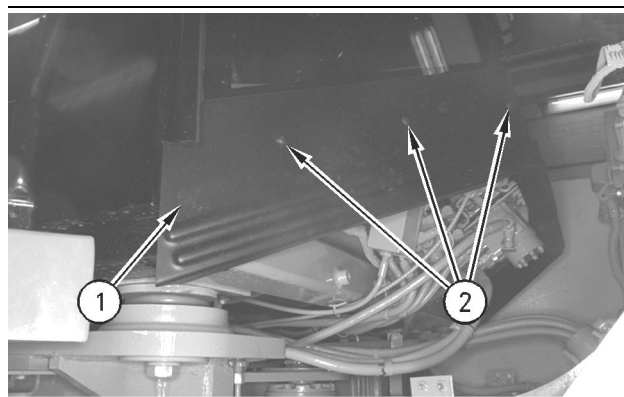


Illustration 263

g01294342

- (1) Panel
(2) Bolts

1. Remove five bolts (2) and panel (1) from each side of the machine.

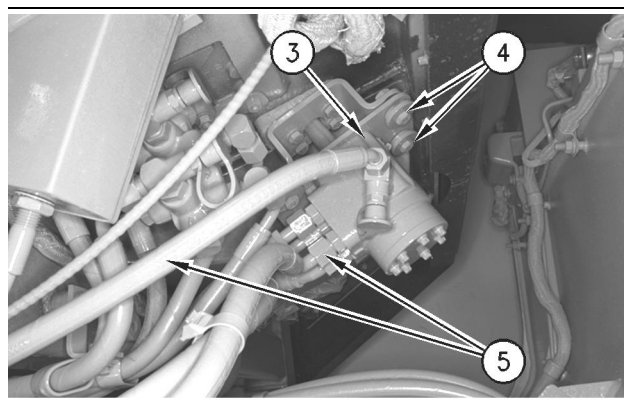


Illustration 264

g01294346

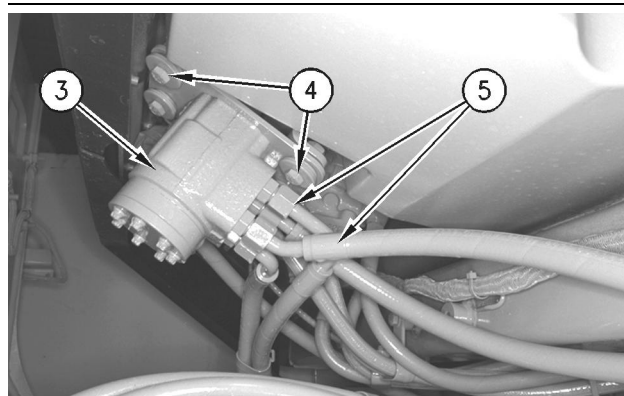


Illustration 265

g01294352

2. Support the metering pump (3). Do not loosen the hose couplings (5).
3. Loosen the four bolts (4) that hold the pump.

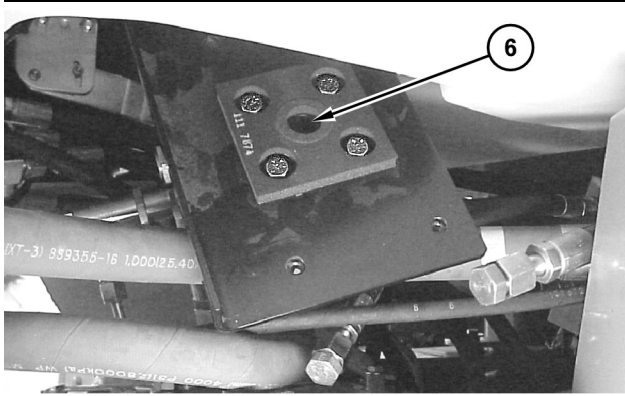


Illustration 266

g01294357

4. Lower the pump in order to expose the splines (6).
5. Clean the male splines on the steering column.
Clean the female splines in the pump.
6. Apply proper grease to the splines. Refer to Operation and Maintenance Manual, "Lubricant Viscosities" for selecting the proper grease.
7. Push the pump into position.
8. Tighten the four bolts that hold the pump.
9. Test the steering system.

i03657091

Steering Cylinder Bearings - Lubricate

SMCS Code: 4303-086-BD

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

WARNING

Crushing Hazard. Insure that the machine ignition switch is in the OFF position and that the parking brake is engaged before entering the articulation area. Failure to do so could result in serious injury or death.

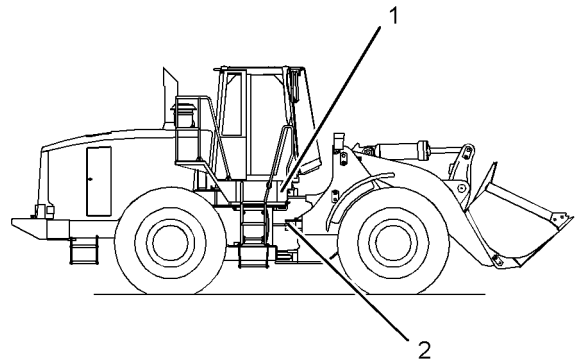


Illustration 267

g01105600

- (1) Location of the grease fittings for the rod ends
- (2) Remote location of the grease fittings for the head ends

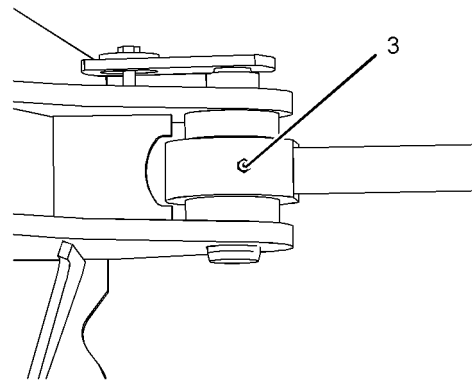


Illustration 268

g01105611

Location of the grease fittings for the rod ends (both sides)

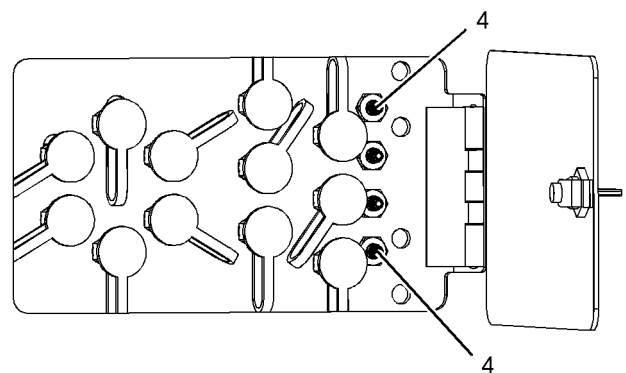


Illustration 269

g01105595

Remote location of the grease fittings for the rod ends

Wipe off the fittings before any lubricant is applied. The rod end of the steering cylinders are lubricated by using standard grease fittings (3).

The head ends of the steering cylinders are lubricated by using remote grease fittings (4) that are located on the right side of the machine in front of the steps.

i05121573

Steering Pilot Oil Screen (Command Control Steering) - Clean/Replace (If Equipped)

SMCS Code: 4304-070-Z3; 4304-510-Z3

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

WARNING

Personal injury can result from working with cleaning solvent.

Because of the volatile nature of many cleaning solvents, extreme caution must be exercised when using them. If unsure about a particular cleaning fluid, refer to the manufacturer's instructions and directions.

Always wear protective clothing and eye protection when working with cleaning solvents.

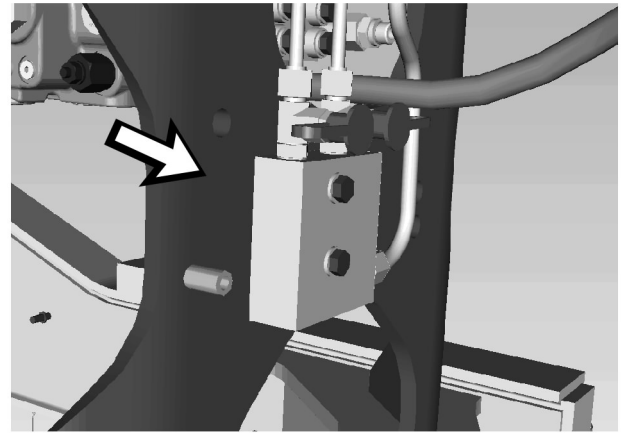


Illustration 270

g03282677

The screen group for the steering oil is located in the articulation joint near the steering neutralizer valve on the right side.

1. Disconnect hoses that are connected to the screen group .
2. Remove the two connectors that are attached to the block.
3. Use an allen wrench in order to remove the two screens from screen group .
4. Wash the screens in a clean, nonflammable solvent.
5. Dry each screen with pressure air. Inspect each screen for damage. Replace the screen if the screen is damaged.
6. Install the screens. Install the connectors and connect the hoses.

i03657340

Steering Pilot Oil Screen (Command Control Steering) - Clean/Replace (If Equipped)

SMCS Code: 4304-070-Z3; 4304-510-Z3

S/N: GTA1-Up

S/N: LCC1-Up

S/N: A7D1-Up

S/N: RYF1-Up

S/N: A6G1-Up

S/N: A7G1-Up

S/N: A6J1-Up

S/N: A7J1-Up

S/N: TAL1-Up

WARNING

Crushing Hazard. Connect the steering frame lock between front and rear frames before servicing the machine in the articulation area. Disconnect the steering frame lock and secure it in the stored position before resuming operation. Failure to do so could result in serious injury or death.

Refer to Operation and Maintenance Manual, "Steering Frame Lock" before entering the articulation joint.

WARNING

Personal injury can result from working with cleaning solvent.

Because of the volatile nature of many cleaning solvents, extreme caution must be exercised when using them. If unsure about a particular cleaning fluid, refer to the manufacturer's instructions and directions.

Always wear protective clothing and eye protection when working with cleaning solvents.

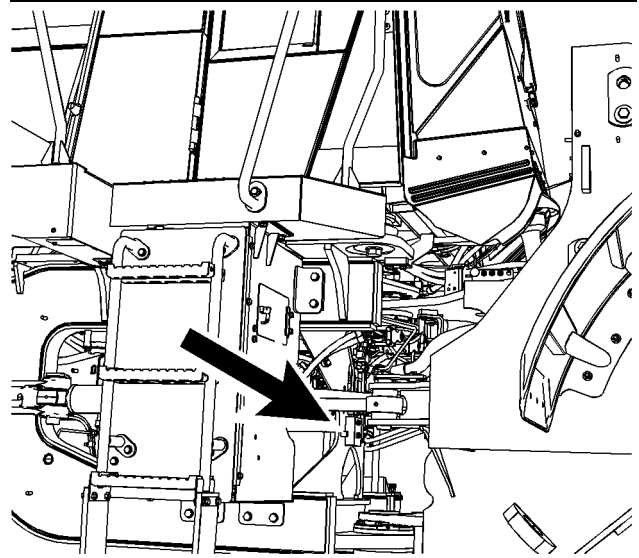


Illustration 271

g01962461

The screen group (3) is located behind the cab.

1. Disconnect hoses (1) and (2) that are connected to the screen group (3).
2. Remove the two connectors that are attached to the block.
3. Use an allen wrench in order to remove the two screens from screen group (3).
4. Wash the screens in a clean, nonflammable solvent.
5. Dry each screen with pressure air. Inspect each screen for damage. Replace the screen if the screen is damaged.
6. Install the screens. Install the connectors and connect the hoses.

i02305841

Tire Inflation - Check

SMCS Code: 4203-535-AI

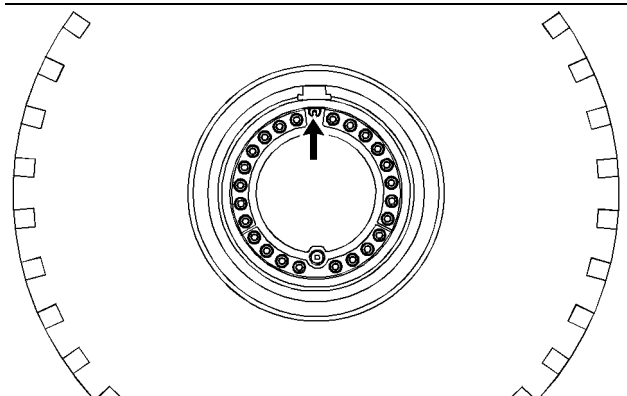


Illustration 272

g01160201

Always obtain proper tire inflation pressures and maintenance recommendations for the tires on your machine from your tire supplier. Measure the tire pressure on each tire.

Inflate the tires with nitrogen , if necessary.

Reference: Refer to the “Tire Inflation Information” section of the Operation and Maintenance Manual for more information.

i02189470

Transmission Oil - Change

SMCS Code: 3030-044

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, “Caterpillar Tools and Shop Products Guide” for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the engine in order to warm the transmission oil. Park the machine on level ground. Lower the bucket and apply slight downward pressure.
2. Engage the parking brake. Stop the engine.

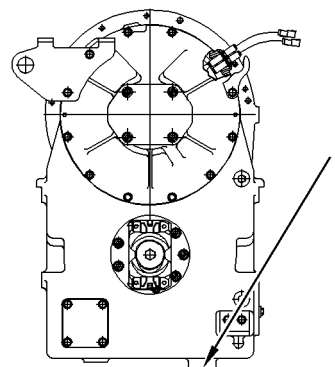


Illustration 273

g01002772

3. Remove drain plug (1) on the bottom of the transfer case.
4. Change the transmission oil filter.

Reference: Refer to Operation and Maintenance Manual, “Transmission Oil Filter - Replace” for the correct procedure.

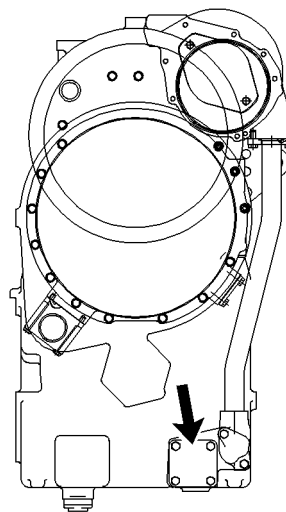


Illustration 274

g00884724

5. The magnetic strainer is on the right rear side of the transfer case. Remove the four bolts, the cover and the seal that holds the magnets and the screen in place.
6. Remove the screen and the magnets from the transfer case housing.
7. Wash the screen in a clean, nonflammable solvent. Use a bristle brush or pressure air to clean the screen. Clean the magnets. Replace any damaged magnets.

8. Clean the cover. Inspect the cover seal. Replace the cover seal if the seal is damaged.
9. Insert the magnets and the screen into the transfer case housing. Install the seal, the cover and the four bolts.
10. Clean the transmission oil drain plug and install the transmission oil drain plug.

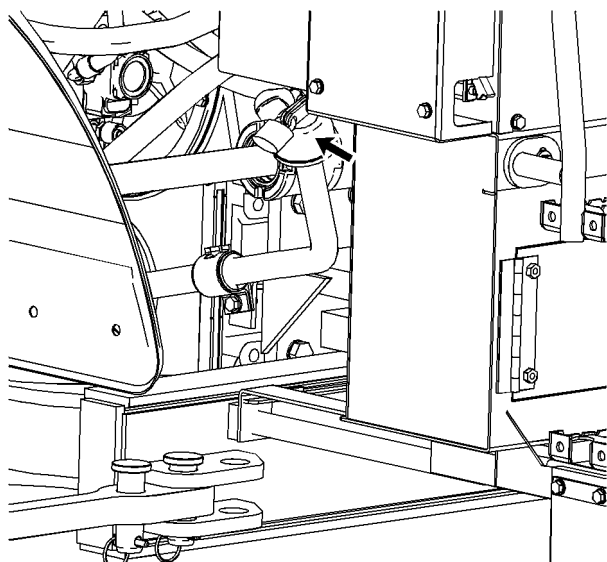


Illustration 275

g01106816

11. Remove the oil filler cap on the left side of the machine and fill the transmission with oil.

Reference: Refer to Operation and Maintenance Manual, "Lubricant Viscosities and Refill Capacities" for the type of lubricant and for the refill capacity.

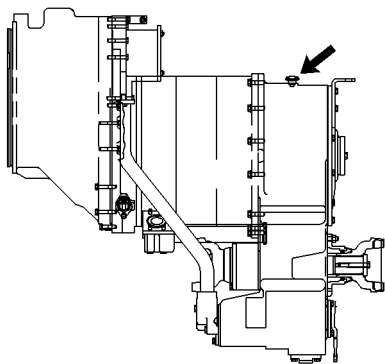


Illustration 276

g011002778

12. Remove the breather from the top of the transfer case. Wash the breather in a clean, nonflammable solvent. Install the breather.

13. Start and run the engine at low idle. Inspect the machine for leaks. Slowly operate the transmission controls in order to circulate the transmission oil.

14. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, "Transmission Oil Level - Check" for the correct procedure.

i02194865

Transmission Oil Filter - Replace

SMCS Code: 3004-510; 3067-510

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

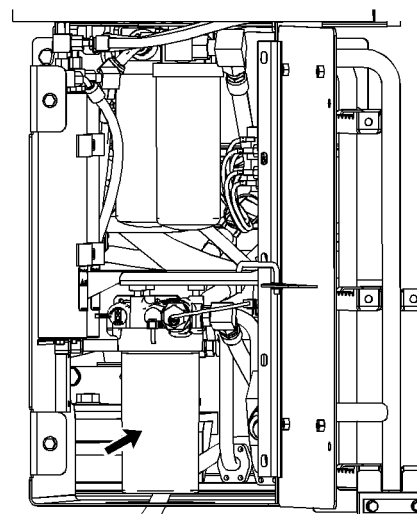


Illustration 277

g01108389

The transmission oil filter is located on the right side of the machine under the platform.

i01468938

Transmission Oil Level - Check

SMCS Code: 3030-535-FLV

1. Operate the machine in order to warm the oil. Park the machine on level ground. Lower the bucket to the ground and apply slight downward pressure.
2. Engage the parking brake and stop the engine.
3. Open the access panel.
4. Remove the filter housing drain plug and allow the oil in the filter to drain into a suitable container.
5. Use a strap type wrench to remove the filter housing.
6. Remove the used filter element. Dispose of the used filter element properly.
7. Clean the filter housing and the filter housing base with a clean, nonflammable solvent.
8. Inspect the filter housing seal. Replace the seal if the seal is damaged.
9. Install the new filter element into the transmission filter housing. Clean the filter housing drain plug and install the drain plug.
10. Start the engine. Slowly operate the transmission controls in order to circulate the transmission oil. Check the machine for oil leaks.
11. Check the transmission oil level.

Reference: Refer to Operation and Maintenance Manual, "Transmission Oil Level - Check" for the correct procedure.

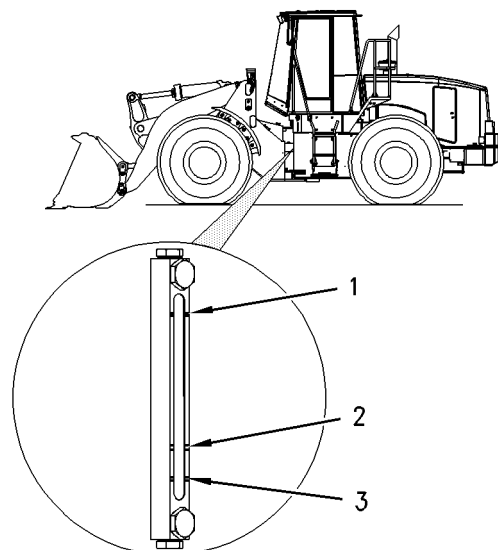


Illustration 278

g00766406

The sight gauge for the transmission oil level is located on the left side of the machine near the articulation joint.

1. Operate the machine for a few minutes in order to warm the transmission oil.
2. Park the machine on a hard, level surface. Put the transmission control into the NEUTRAL position. Lower the bucket to the ground with a slight downward pressure. Engage the parking brake.

Note: Before the machine is started, the transmission oil level should be above "MIN START" mark (1) on the upper end of the sight gauge.

3. Check the oil level while the engine is running at low idle.

While the engine is running at low idle, the transmission oil level should be between the "MIN" mark (3) and the "MAX" mark (2).

4. If necessary, remove the filler cap and add oil.

i02195036

Transmission Oil Sample - Obtain

SMCS Code: 3080-008; 7542

NOTICE

Care must be taken to ensure that fluids are contained during performance of inspection, maintenance, testing, adjusting and repair of the product. Be prepared to collect the fluid with suitable containers before opening any compartment or disassembling any component containing fluids.

Refer to Special Publication, NENG2500, "Caterpillar Tools and Shop Products Guide" for tools and supplies suitable to collect and contain fluids on Caterpillar products.

Dispose of all fluids according to local regulations and mandates.

1. Operate the machine for a few minutes before obtaining the oil sample. This will thoroughly mix the transmission oil for a more accurate sample.

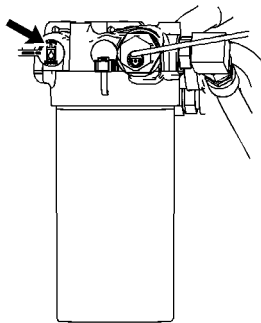


Illustration 279

g01108497

2. The sampling valve for the transmission oil is located on the transmission oil filter base on the right side of the machine under the platform. Use the in-line sampling valve in order to obtain a sample of transmission oil.

Reference: For more information, refer to Special Publication, SEBU6250, "Caterpillar Machine Fluids Recommendations", "S-O-S Oil Analysis" and Special Publication, PEHP6001, "How To Take A Good Oil Sample".

i02189520

Window Washer Reservoir - Fill

SMCS Code: 7306-544

NOTICE

When operating in freezing temperatures, use Caterpillar nonfreezing window washer solvent or equivalent. System damage can result from freezing.

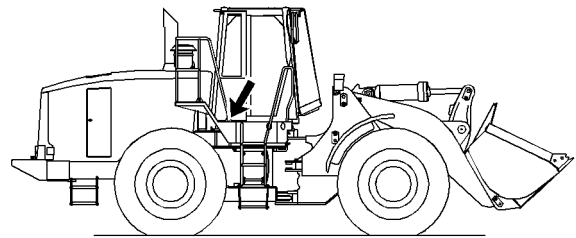


Illustration 280

g01106828



Window Washer Reservoir – The window washer reservoir is located under an access door on the platform on the right side of the machine. Fill the window washer reservoir through the filler opening.

i03657573

Window Wiper - Inspect/Replace

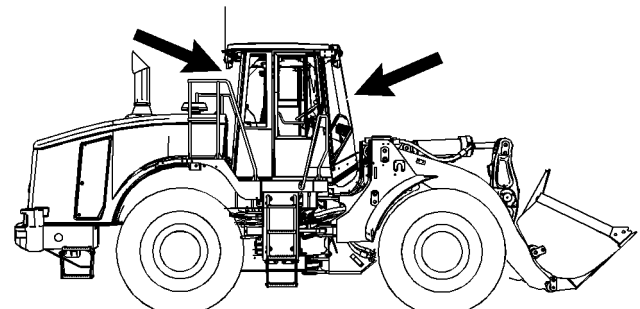
SMCS Code: 7305-040; 7305-510

Illustration 281

g01962467

Inspect the condition of the wiper blades on the front window and on the rear window. Replace the wiper blades if the wiper blades are worn or damaged or if streaking occurs.

i04412316

Windows - Clean

SMCS Code: 7310-070

Clean the outside of the windows from the ground, unless handholds are available.

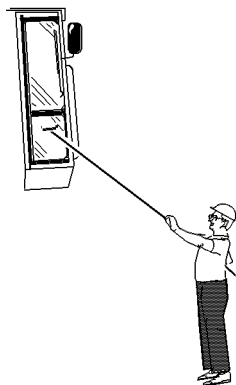


Illustration 282

g00566124

Typical example

Cleaning Methods

Commercial Window Cleaner

Apply the cleaner with a soft cloth. Rub the window with moderate pressure until all the dirt is removed. Allow the cleaner to dry. Wipe off the cleaner with a clean soft cloth.

Soap and Water

Use a clean sponge or a soft cloth. Wash the windows with a mild soap or with a mild detergent. Also use plenty of lukewarm water. Rinse the windows thoroughly. Dry the windows with a moist chamois or with a moist cellulose sponge.

Stubborn Dirt and Grease

Wash the windows with a good grade of naphtha, of isopropyl alcohol, or of Butyl Cellosolve. Then, wash the windows with soap and with water.

Polycarbonate Windows (If equipped)

Wash polycarbonate windows with a mild soap or detergent. Never use a cleaning solvent on polycarbonate windows.

Wash polycarbonate windows with warm water and a soft sponge, or damp cloth. Never use a dry cloth or paper towels on polycarbonate windows.

Rinse the windows with a sufficient amount of clean water.